

H. B. CROCKER COMPANY

A FLORA OF CALIFORNIA

H. S. CROCKER CO

ABBREVIATIONS

Var. *caudicifera* Jepson n. comb. Alpine perennial, all the parts much reduced; caudex branching, the branchlets short and densely leafy, bearing one terminal scape-like stem $\frac{1}{2}$ to 2 inches high; leaves 3 to 6 (or 10) lines long; flowers glomerate-capitate.—Sierra Nevada, 8000 to 13,000 feet; north to Washington and east to Wyoming.

Locs.—Mt. Whitney, *Jepson* 1073; Mt. Dana, *Jepson* 3288; Dana Fork, Tuolumne River, *Jepson* 3261; Macomb Ridge, Yosemite Park, *Jepson* 4560; Mt. Shasta, *Jepson*.

Refs.—CALYPTRIDIMUM UMBELLATUM Greene, Bull. Torr. Club, 13: 144 (1886). *Spraguea umbellata* Torr. Pl. Frem. 4, pl. 1 (1853), type loc. "forks of Nozah River," n. Sierra Nevada foothills west of Lassen Peak, *Fremont*; Hook. Bot. Mag. t. 5143 (1859).

This species is the type of the genus *Spraguea* Torr. l. c., a genus which was invalidated by the discovery of *Calyptridium quadripetalum* Wats. The latter species is an undoubted *Calyptridium* and yet it is most interestingly related to *Spraguea* on account of its scorpioid flower-imbriated spikes and scarious orbicular round-reniform sepals. *Calyptridium umbellatum* is variable but scarcely as much so as the following synonymy would indicate. *C. nudum* Greene, Pitt. 1: 64 (1887), type loc. Donner Lake, *Sonne*. *C. monospermum* Greene, *Erythea*, 3: 63 (1895), type loc. Big Cottonwood Mdns. near Mt. Whitney, *Koch*. *Spraguea pulchella* Eastw. Bull. Torr. Club, 29: 79 (1902), type loc. Pea Ridge Road, Mariposa Co., *Congdon*; petals oblong to linear, acute; ovary 1 or 2-ovuled.—Ex. char. *S. eximia* Eastw. l. c. 30: 486 (1903), type loc. Sulphur Banks, Lake Co., *Agnes Bowman*; stamens not quite as long as petals.—Ex. char.

Var. CAUDICIFERA Jepson. *Spraguea umbellata* var. *caudicifera* Gray in Patterson, Checklist N. Am. Pl. 14 (1892). *S. multiceps* Howell, *Erythea*, 1: 39 (1893), type locs. Mt. Hood and Mt. Adams.

2. CALANDRINIA H.B.K.

Ours low fleshy annuals with alternate entire leaves and ephemeral red or rose-colored flowers, rarely varying to white. Flowers in a leafy raceme or in a panicle. Sepals 2, persistent. Petals 5, rarely more or less (3 to 7). Stamens 5 to 14, rarely 3, seldom of the same number as the petals. Style-branches 3. Capsule 3-valved from the apex. Seeds numerous, black and often shining.—(J. L. Calandrinii, Swiss botanist.)

Calandrinia has its greatest development in the southern hemisphere. There are about 60 species on the Pacific Coast of the two Americas, chiefly in Chile, and 16 species in Australia. *C. caulescens*, *C. breweri* and *C. maritima* are perhaps introduced into California from the southward. The var. *menziesii* of the first named, in particular, behaves strangely like an immigrant.

Flowers in a raceme or mostly so; seeds with a strophiole.

Herbage green; calyx green; racemes erect; pedicels clavate-thickened and a little angled; seed black and shining, apparently smooth but microscopically papillate, the strophiole white, minute.

Capsule enveloped by the fruiting calyx, the latter as long or nearly; branches mostly ascending or erect; common.....1. *C. caulescens*.

Capsule nearly twice as long as the fruiting calyx; branches mostly trailing; rare....

2. *C. breweri*.

Herbage glaucous; calyx and bracts black-veined or mottled; racemes a little drooping at apex, the pedicels filiform; seed roughish, with a large strophiole; rare.....

3. *C. maritima*.

Flowers in an umbellate panicle; seeds without a strophiole; Colorado Desert...4. *C. ambigua*.

1. *C. caulescens* H. B. K. Stems spreading or ascending, 6 to 12 inches high; leaves narrowly oblanceolate to linear, acute, 1 to 2 inches long, somewhat succulent; flowers short-pedicel; pedicels erect; sepals ovate, apiculate or short-acuminate, glabrous or somewhat hispidulous on the margins or midribs; petals 5, red, obovate, obtuse, 2 to 4 lines long; stamens 3 to 6, sometimes more; capsule ovate, short-pointed, enveloped by the sepals which are nearly or quite as long.

Humboldt Co. and southeastern California; Arizona; south to Bolivia.

Var. *menziesii* Gray. RED MAIDS. (Fig. 92.) Stems 1 to several or many from the base, simple or sparingly branched, diffuse, or erect and simple, $\frac{1}{2}$

to 2 feet long; pedicels long (5 to 11 lines long) or sometimes short (3 to 5 lines long); petals orbicular-obovate, retuse at apex, crimson or rose-red, 3 to 5 lines long; stamens 7 to 14, commonly 10 to 12, rarely fewer than 7.—Orchards and vineyards, often very abundant in wet years; also in fields and on hilltops. Mar.-Apr. Flowers opening of afternoons. Called "Kisses" in Solano Co.

Loes.—Egg Lake, Modoc Co., *Baker*; Crane Creek, Tehama Co., *Jepson*; Elk Grove, *Drew*; Vacaville, *Jepson* 520; Napa Valley, *Jepson*; Collinsville, *Jepson*; Amador Co., *Hansen* 907; Clements, San Joaquin Co., *Jepson* 1823; French Camp, *Sanford*; Berkeley, *Jepson*; Stanford University, *C. F. Baker* 277; Grapevine Spr., Tulare Co., *Woolsey*; San Bernardino, *Parish*.

Refs.—*CALANDRINIA CAULESCENS* H. B. K. Nov. Gen. & Sp. 6: 78, t. 526 (1823), type locs. Bolivia and Mexico. Var. *MENZIESII* Gray, Proc. Am. Acad. 22: 277 (1887). *C. menziesii* T. & G. Fl. 1: 197 (1838). *Talinum menziesii* Hook. Fl. Bor. Am. 1: 223, t. 70 (1834), type from "N. W. America" south of the Columbia River, probably California, *Menzies*.

2. *C. breweri* Wats. Stems lax, trailing or sometimes ascending, 1 to 2 feet long; leaves spatulate or oblong-spatulate, 1 to 2½ inches long; flowers sparse; pedicels longer than in no. 1, typically deflexed in fruit; capsule narrower and longer (5 to 6 lines long) than in no. 1, at length twice or nearly twice as long as the calyx; sepals with a grooved edge, the lower margin of the groove scarious.

Fig. 92. *CALANDRINIA CAULESCENS* var. *MENZIESII* Gray; portion of flowering branch, x 1.

Coast Ranges and Sierra Nevada; Lower California. The known localities few and scattered. June.

Loes.—Coulterville, *Congdon*; Mt. Tamalpais, *Jepson*; Painted Cave Ranch, Santa Barbara, *Eastwood*; San Bernardino Mts., *Parish* 6221; Santa Cruz Isl. (*Zoe*, 1: 133).

Refs.—*CALANDRINIA BREWERI* Wats. Proc. Am. Acad. 11: 124 (1876), type loc. Santa Inez Mts., *Brewer*; Brandege, *Zoe*, 2: 121 (1891). *C. menziesii* var. *macrocarpa* Gray, Proc. Cal. Acad. 3: 102 (1864), type the same as *C. breweri*.

3. *C. maritima* Nutt. Stems several from the base, spreading or ascending, 3 to 8 inches long; herbage very glaucous; leaves mostly basal or on lower part of stem, spatulate-obovate, narrowed to a petiole-like base, 1 to 2½ inches long; flowers long-pedicel in a terminal raceme or loose panicle, ¼ to 1¼ inches long; flowers red; sepals round-ovate, dark-veined, mucronate or abruptly short-acute, slightly surpassed by the ovate capsule.

Southern California coast. Lower California.

Loes.—Santa Monica (Gray, Syn. Fl. 1: 270); San Diego, *Abrams* 3461; Santa Cruz Isl. (*Zoe*, 1: 133).

Ref.—*CALANDRINIA MARITIMA* Nutt.; T. & G. Fl. 1: 197 (1838), type loc. San Diego, *Nuttall*.

4. *C. ambigua* Howell. Stems several from the base, erect or a little spreading, 2 to 7 inches high; stems and leaves very succulent; leaves linear-spatulate, 1 to 1½ inches long; flowers pedicel in rather compact umbellate panicles; pedicels 1 to 3 lines long; sepals ovate with shortly acute spreading tips and

white-scarious margins, 1 to $2\frac{1}{2}$ lines long, equaling or exceeding the 5 obovate white petals; stamens 5 (or 6 to 8); seeds many.

Colorado Desert. Apr.-May.

Locs.—Coachella, *Greata*; Borrego Spr., *T. Brandegee*; McCoy Wash, *Hall* 5947; Indio, acc. *Parish*.

Refs.—CALANDRINIA AMBIGUA Howell, *Erythea*, 1: 34 (1893). *Claytonia ambigua* Wats. Proc. Am. Acad. 17: 365 (1882), type loc. El Rio, Colorado River, *Lemmon*. *Calandrinia sesuvioides* Gray, Proc. Am. Acad. 22: 278 (1887).

3. MONTIA L. INDIAN LETTUCE.

Moderately succulent low herbs, very glabrous and often glaucous. Stems usually clustered. Leaves alternate, opposite, or basal. Flowers white or pinkish, commonly nodding in the bud, usually reopening the second or third day, borne in racemes or clusters, sometimes solitary. Pedicels commonly spreading or recurved in fruit. Sepals 2, persistent. Petals 5, equal or somewhat unequal, distinct, or more or less connate at base. Stamens 5 or 3. Style-branches 3. Capsule 3-valved from the apex, 1 to 3-seeded.—About 20 species, chiefly western North America, one species cosmopolitan. (Giuseppe Monti, Italian botanist, died 1760.)

Our representatives of the genus fall into groups of a few closely related species. The species in a group sometimes differ by slight characters and tend to run together. *Montia perfoliata* is especially variable; while its extreme variants are sufficiently pronounced for specific rank, such status is precluded by numerous intermediate forms. Moreover occasional plants, fairly typical of the species, show in their development stages similar to the various forms here listed as varieties. All of the species have the pedicels more or less recurving in fruit, save that in *Montia sibirica* the spreading or deflexed pedicels remain straight.

A. Petals united at base into a tube, not notched at apex.

Stamens 3; petals unequal; leaves opposite.....1. *M. fontana*.

B. Petals distinct or a little united, commonly notched at apex.

1. Leaves alternate; petals equal or unequal.

Stamens 3; annuals; petals unequal.

Petals minute; upper leaves scarious-dilated at base.....2. *M. howellii*.

Petals 2 lines long; leaves less scarious-dilated at base or scarcely at all so.....

3. *M. linearis*.

Stamens 5; petals equal.

Stems diffuse, dichotomous; annual.....4. *M. diffusa*.

Flowering stems simple and scape-like; perennial by stolons or bulblets. 5. *M. parvifolia*.

2. Leaves basal or opposite; petals equal; stamens 5.

Stems bearing several pairs of opposite leaves; racemes axillary or terminal; perennial by bulblets.....6. *M. chamissoi*.

Stems bearing one pair of leaves, these opposite; racemes terminal.

Cauline pair of leaves more or less united; annuals.

Cauline pair of leaves united into a roundish or angular disk; petals commonly white and usually little surpassing the sepals; rather coarse annual. 7. *M. perfoliata*.

Cauline pair of leaves not forming a disk, partially joined on one side.

Stems slender; petals commonly pink, 3 times as long as sepals.....8. *M. gypsophiloides*.

Caespitose dwarf; petals white, little exceeding sepals.....9. *M. spathulata*.

Cauline pair of leaves quite distinct.

Pedicels 1 to 3 lines long; annuals.

Plant somewhat diffuse; leaves narrowly linear.....10. *M. exigua*.

Plant a succulent ball; leaves obovate or spatulate, nearly sessile.....

11. *M. sarosa*.

Pedicels $\frac{1}{2}$ to 2 inches long.

Pedicels bracteate; annuals or perennials.

Stem from a thick crown or short rootstock; coast.....12. *M. sibirica*.

Stem from tuberous rootstock or cornlet; high southern Sierra.....

13. *M. heterophylla*.

Pediceles bractless; plants with horizontal rootstock.....14. *M. asarifolia*.

1. ***M. fontana*** L. WATER CHICKWEED. Annual, or sub-perennial by rooting at the nodes; stems slender, 2 to 6 inches long, ascending or procumbent; leaves opposite, narrowly oblanceolate to spatulate-obovate or oblong, slightly connate at base, 2 to 10 lines long; racemes loose, 3 to 9-flowered; sepals $1\frac{1}{2}$ to 1 line long; petals minute, white, unequal, united at base, and exceeding little the sepals; seeds minute, roughened.

In water on margins of small surface streams or in muddy places. Occasional throughout California. Northward to British Columbia and far across the continent. Of world-wide distribution. Mar.-May.

Locs.—Coast Ranges: Berkeley Hills, *Tracy* 540; San Bruno Hills, *Jepson*; San Francisco, *Chesnut*; Ross Valley, *Drew*; Pt. Reyes, *Greene*; Kenwood, *Bioletti*; Rutherford and Calistoga, *Jepson*; Snow Mt., *T. Brandege*; Eureka, *Tracy* 2955; Oro Fino, Siskiyou Co., *Butler* 679. Sierra Nevada: Jackson, *Hansen*; Webber Lake, *Kennedy & Doten*; Ft. Bidwell, *Manning* 116. Southern California: Witch Creek (*Erythea*, 3: 60). The var. *TENERRIMA* Fernald occurs in Indian Valley, Plumas Co., acc. Gray; it is very slender with mostly broad-spatulate petioled leaves in only 2 or 3 pairs, long-peduncled inflorescence, and sepals barely 1 line long.

Refs.—*MONTIA FONTANA* L. Sp. Pl. 87 (1753), type European; Jepson, Fl. W. Mid. Cal. 187 (1901). Var. *TENERRIMA* Fern., Rhod. 12: 138 (1910). *Claytonia chamissonis* var. *tenerima* Gray, Proc. Am. Acad. 8: 378 (1872), type loc. Ore., *Elihu Hall*. *C. hallii* Gray, l. c. 22: 283 (1887), type same as in var. *tenerima* Fern. *Montia hallii* Greene, Fl. Fr. 180 (1891), "corolla twice the length of the calyx".

2. ***M. howellii*** Wats. Annual; stems simple or branching, diffuse or procumbent, $\frac{1}{2}$ to 2 inches long; leaves alternate, elongated linear-spatulate, 4 to 10 lines long; racemes axillary, umbellately 2 or 3-flowered, shorter than the leaves; leaves opposite the racemes with a rather broad scarious-dilated clasping base, the racemes subtended by an ovate or short scale-like scarious bract; petals 3 or 4, unequal, minute, sometimes absent; stamens 3; seeds shining, microscopically foveolate-linearate.

Very wet soil, coast region: Humboldt Co. north to Washington.

Ref.—*MONTIA HOWELLII* Wats. Proc. Am. Acad. 18: 191 (1883), type loc. Sauvie Isl., Ore., *Jos. & Thos. Howell*. Perhaps this is an alternate-leaved variety of *M. fontana*, with which it quite agrees in habit.

3. ***M. linearis*** Greene. Annual, nearly simple or very much branched, erect, 1 to 6 inches high; leaves alternate, narrowly and elongated linear (1 to $2\frac{1}{2}$ inches long and $\frac{1}{2}$ to 1 line wide), sessile by a clasping base; racemes terminal, commonly secund, about 4 to 8-flowered; pedicels 2 to 5 lines long; sepals broad and rounded or almost truncate, white-margined, straw-color in age; petals white, unequal, narrowly obovate, narrowed at base or clawed, slightly united on one side and not on the other side, 2 to $2\frac{1}{2}$ lines long, slightly exceeding the sepals; stamens 3, inserted on the very base of the smaller petals; seeds lenticular, nearly or quite 1 line broad, smooth and shining, finely reticulated under a lens.

Wet banks: central Sierra Nevada, 3000 to 4500 feet, and Coast Ranges. East into Nevada, north to British Columbia and Montana.

Locs.—Coast Ranges: Las Trampas, Contra Costa Co., *Hall* 1626; Napa Valley, *Bigelow* in 1854 (acc. Pac. R. Rep. 4: 71); Yager, Humboldt Co., *Blankinship*; Yreka, *Butler* 680; Oro Fino, *Butler* 677. Sierra Nevada: Yosemite, *Harriet Walker* 2432; Pioneer, Amador Co., *Hansen*; Prosser Creek, Nevada Co., *Sonne*; Prattville, *Brandegee*; Forestdale, Modoc Co., *M. S. Baker*; Ft. Bidwell, *Manning* 99.

Refs.—*MONTIA LINEARIS* Greene, Fl. Fr. 181 (1891); Jepson, Fl. W. Mid. Cal. ed. 2, 162 (1911). *Claytonia linearis* Dougl.; Hook. Fl. Bor. Am. 1: 224, pl. 71 (1834), type loc. Great and Little Falls of the Columbia River, *Douglas*.

M. DICHOTOMA Howell, *Erythea*, 1: 36 (1893). Similar to *M. linearis* but smaller in all its parts; diffuse or depressed, branching from the base and above, 1 to 3 inches high; leaves linear, 1 inch long or less; flowers many and secund in a dense terminal raceme; sepals 1 line long, the petals unequal, white, slightly longer; seeds dull, $\frac{1}{3}$ to $\frac{1}{2}$ line broad.—Oregon and Washington. Yreka acc. Bot. Cal. 2: 436. (*Claytonia dichotoma* Nutt.; T. & G. Fl. 1: 202,—1838, type loc. mouth of the Willamette River, Nuttall.)

4. *M. diffusa* Greene. Annual, diffusely branched from the base, 2 to 6 inches high; cauline leaves alternate, deltoid-ovate to ovate or the upper narrowly ovate, acute, $\frac{1}{2}$ to 1 inch long, the petiole nearly as long or longer; racemes 2, 3, or 4 on a branch, opposite the upper leaves or terminal, 1 to $1\frac{1}{2}$ inches long, each 4 to 7-flowered; petals emarginate, white or pink, equal, 2 lines long, slightly exceeding the sepals; pedicels deflexed or divergently spreading in fruit; seeds black, $\frac{1}{2}$ line long, lineated, the lineations composed of narrow transverse plates.

Under pines in the coast region: Marin Co. to Humboldt Co. North to Washington. Rare.

Locs.—Mill Valley, *Eastwood*; San Rafael, *Henry Edwards* in 1878; near Buck Mt., Van Duzen River, *Tracy* 2725.

Refs.—*MONTIA DIFFUSA* Greene, Fl. Fr. 181 (1891); Jepson, Fl. W. Mid. Cal. 187 (1901). *Claytonia diffusa* Nutt.; T. & G. Fl. 1: 202 (1838), type loc. Ft. Vancouver, Columbia River, Nuttall.

5. *M. parvifolia* Greene. Flowering stems erect or slightly spreading, whip-like or filiform and somewhat scape-like, 5 to 9 or 12 inches high, arising from the lower axils of *Sedum*-like rosettes of leaves borne on short caudex-like stems; these caudices also produce filiform surface runners; leaves of the rosettes ovate to oblanceolate, acute, 3 to 7 (or 10) lines long, passing into petioles as long or nearly; leaves of the flowering stems reduced above, small and bract-like (2 to 4 lines long), and bearing in their axils fleshy bulblets which fall away readily, the plant perennial by these; flowers umbellately racemose; racemes 2 to 7-flowered; sepals roundish, 1 line long, the petals equal, white or pink, retuse, 3 to 5 lines long; capsule mostly 1-seeded; seed rather dull, with minute pits.

Mossy surface of rocks and moist banks: Coast Ranges; Sierra Nevada from Yosemite northward. Far north to Alaska, east to Montana.

Locs.—Coast Ranges: Little Sur River, *T. Brandegee* (only known station in South Coast Ranges); Mt. Tamalpais (Zoe, 4: 68); Sonoma Creek, *M. S. Baker*; Navarro, *Edith Byrbee*; Jarnigan's, Humboldt Co., *Chesnut & Drew*; Redwood Creek, Humboldt Co., *Jepson* 1961; Humboldt Co., *Tracy* 2708 (near Buck Mt.), 3226 (Little River); Hupa Valley, *Chandler* 1261; Preston Peak, Klamath Range, *Jepson* 2880. Sierra Nevada, 4000 to 8200 ft.: Yosemite Park, *Jepson* 4350 (Yosemite Falls), 3137 (Vernal Fall), 4576 (Kerrick Cañon), 4575 (Stubblefield Cañon); Little Chico Cañon, *R. M. Austin*.

Refs.—*MONTIA PARVIFOLIA* Greene, Fl. Fr. 181 (1891); Jepson, Fl. W. Mid. Cal. 187 (1901). *Claytonia parvifolia* Moq. in DC. Prodr. 3: 361 (1828), type loc. Nootka, Vancouver Island. *C. filicaulis* Hook. Fl. Bor. Am. 1: 224, t. 72 (1834). *Montia obtusata* Heller, Muhl. 2: 32 (1905), type loc. Shasta Retreat, Siskiyou Co., *Heller* 7945.

6. *M. chamissoi* Dur. & Jac. TOAD-LILY. Stems decumbent or ascending, 2 to 6 inches or 1 foot long, leafy to the top, rooting at the lower nodes; perennial by means of little tuber-like bulblets produced at the end of slender runners; leaves opposite, oblanceolate to oblong-obovate, obtuse or acute at apex, tapering into a petiole at base, $\frac{1}{2}$ to 1 (or 2) inches long; racemes axillary or terminal, 2 to 8-flowered, rarely 1-flowered, bractless except 1 or 2 small bracts at base; sepals orbicular, 1 line long, the petals white or pink, elliptic, rounded at apex and entire, or sometimes retuse, 3 to 4 lines long; capsule small; seeds muriculate-roughened.

Wet or swampy meadows or moist stream borders: Sierra Nevada, 4000 to 9000 feet, and North Coast Ranges. North to Alaska.

Locs.—Sierra Nevada: Greenhorn Range, *Hall & Babcock* 5051; Golden Trout Creek, *Jepson* 4932; Cottonwood Creek, Inyo Co., *Jepson* 5075; Pine Ridge, Fresno Co., *Hall & Chandler* 106; Tuolumne Mdw., *Jepson* 3242; Bloody Cañon, Mono Co., *Jepson* 4440 (petals 5 or 6, the stamens as many); Spur, Alpine Co., *Hansen*; Blue Cañon, *Harriet Walker* 1359; Truckee, *Sonne*; Prattville, *Brandege*; Ft. Bidwell, *Manning* 115. Coast Ranges: Snow Mt., *Brandege*; Mt. Pinos, *Hall* 6650. Southern California: Tamarack Valley, Mt. San Jacinto, *Hall* 2362; Bear Valley, San Bernardino Mts., *Parish*.

Refs.—*MONTIA CHAMISSOI* Dur. & Jac. Index Kew. Sup. 1: 282 (1901). *Claytonia chamissoi* Ledeb. in Spreng. Sys. Veg. 1: 790 (1825), type loc. Aleutian Islands; Cov. Contrib. U. S. Nat. Herb. 4: 72 (1893); Holzinger, Pl. World, 4: 41 (1901). *C. chamissonis* Esch. Linnaea 6: 562 (1831). *Montia chamissonis* Greene, Fl. Fr. 180 (1891); Jepson, Fl. W. Mid. Cal. ed. 2, 161 (1911). *Crunocallis chamissonis* Rydb. Bull. Torr. Club, 33: 139 (1906).

7. *M. perfoliata* Howell. MINER'S LETTUCE. (Fig. 93.) Annual; stems several, erect or diffuse, 4 to 10 (or 16) inches high; basal leaves rhomboidal or deltoid to ovate or lanceolate or the earliest narrowly linear, $\frac{1}{2}$ to 2 inches long, long-petioled; cauline pair completely united into a round and entire or angulately 2-lobed disk $\frac{1}{2}$ to 2 (or 4) inches broad; racemes more or less interrupted (the flowers in 2s or 3s or fascicles), variable in length, sessile or on peduncles $\frac{1}{4}$ to $1\frac{1}{2}$ inches long, or the flowers glomerate on the disk in a sessile cluster; pedicels 1 to 5 lines long, rarely $\frac{3}{4}$ inch; sepals roundish, 1 to 2 lines long; petals white, $1\frac{1}{4}$ to $1\frac{1}{2}$ times length of sepals.

Mostly in the shade of oaks and other trees throughout California, also common in orchards and vineyards: Coast Ranges (mostly valleys and lower foothills); Great Valley; Sierra Nevada (mostly cañon valleys and foothills, but ranging to middle altitudes); Southern California ("common in the valleys and ascending the mountains to 7000 feet, becoming exiguous at the upper limit."—*Parish*). Extends north to British Columbia and south into Lower California. Also called Indian Lettuce and Squaw Cabbage.



Fig. 93. *MONTIA PERFOLIATA* Howell. *a*, a large plant drawn one-third the natural size; *b*, flower, $\times 1$. The plants vary greatly in size according to situation, often becoming very small or depauperate.

Plants growing in one spot, of like aspect and habit and not differing save for marked variations in some one organ, may often be discovered by the field student. Extreme variability in size according to soil or situation is characteristic of this species. It is also highly variable in the size and shape of its basal leaves, as well as of those forming the cauline disk. Plants in a colony at Palomar (Jepson 1494) were quite alike save that the individuals showed, altho inconstantly, the following variations in cauline leaves: *a*, cauline pair completely united into a perfoliate disk, and entire or toothed; *b*, cauline pair united into a perfoliate disk split down one side; *c*, cauline pair ovate or lanceolate, distinct; *d*, cauline pair ovate or lanceolate, partly united on one side.

Locs.—Linden, San Joaquin Co., Gunnison; Amador Co., Hansen 35; Hazel Green, Jepson; Grapevine Spr., Tulare Co., Woolsey; Panamint Mts., Hall 6971; St. Helena, Jepson; Ross Valley, Jepson; Berkeley, Jepson; San Francisco, K. Brandegee; Los Gatos, Heller; Pacific Grove, Tidestrom; Elizabeth Lake, Hall 3090; Elysian Hills, Los Angeles, Braunton 164; Santa Ana Cañon, San Bernardino Mts., R. J. Smith.

Var. *parviflora* Jepson n. comb. Same as the species in habit, but more slender; basal leaves filiform-linear or linear-spatulate; calyx 1 line long; petals white or rose-color.—Damp shady places. General range of the species. In the form in which it occurs in California this seems no more than a narrow-leaf state of *M. perfoliata* and is here so treated; its seeds are not different. Lower California. North to Washington.

Locs.—Yreka, Butler 675, 1305, 1550; Little River, Humboldt Co., Tracy 3211; Redding, Heller 7900; Tehama Co., Jepson; Deer Creek Ridge, w. Nevada Co., Jepson; Amador Co., Hansen; Santa Clara Co., C. F. Baker 487; Girard, Kern Co., Heller 7716.

Var. *nubigena* Jepson. Compact or caespitose plant with glaucescent herbage and numerous stems; leaves linear or a few spatulate at apex; racemes dense; petals white or pinkish, 3 lines long.—Mountain peaks, central Coast Ranges.

Locs.—Mt. Tamalpais, Jepson; Mt. Diablo, Greene; Mt. Hamilton (Pitt. 2: 294).

Var. *depressa* Jepson n. comb. Small and depressed, 1 to 4 or 5 inches high. the plant often livid red; basal leaves rhomboidal or broadly ovate, 2 to 6 lines broad, often broader than long, petioled; cauline disk split down one side or its leaves only partly united, subtending sessile glomerules or sub-umbellate clusters of flowers; petals twice as long as calyx.—Northern California to British Columbia. Often in pine woods.

Locs.—Humboldt Bay, Tracy 3129; Dunsmuir, Heller 7924; Siskiyou Co., Butler 676 (Oro Fino), 1289 (Humboldt Mt.); Forestdale, Baker & Nutting; Ft. Bidwell, Manning 74.

Refs.—*MONTIA PERFOLIATA* Howell, Erythea, 1: 38 (1893); Jepson, Fl. W. Mid. Cal. 186 (1901). *Claytonia perfoliata* Donn, Ind. Hort. Cantab. 25 (1796); Willd. Sp. Pl. 1: 1186 (1798); type from N. Am. *C. perfoliata* var. *amplectens* Greene, Fl. Fr. 179 (1891), type loc. middle elevations, Sierra Nevada; cauline pair of leaves united on one side only. Var. *carinosa* Greene, l. c. 178, type loc. Mt. Diablo; very succulent; seed nearly orbicular.—Ex. char. Var. *PARVIFLORA* Jepson. *Claytonia perfoliata* var. *parviflora* Torr. Pac. R. Rep. 4²: 71 (1857). *Claytonia parviflora* Dougl.; Hook. Fl. Bor. Am. 1: 225, t. 73 (1834), type loc. Columbia River, Douglas. *C. perfoliata* var. *angustifolia* Greene, Fl. Fr. 179 (1891), type Californian. *Limnia parviflora* Rydb. Bull. Torr. Club, 33: 139 (1906). *Montia parviflora* Howell, Erythea, 1: 38 (1893). Var. *NUBIGENA* Jepson, Fl. W. Mid. Cal. 186 (1901). *Claytonia nubigena* Greene, Pitt. 2: 294 (1892), type locs. Mts. Tamalpais, Diablo, and Hamilton. Var. *DEPRESSA* Jepson. *Montia parviflora* var. *depressa* Rob. in Gray, Syn. Fl. 1¹: 274 (1897). *Claytonia parviflora* var. *depressa* Gray, Proc. Am. Acad. 22: 281 (1887), type loc. "British Columbia to Oregon and adjacent Idaho." *Montia depressa* Suksd. Deutsche Bot. Monats. 16: 221 (1898). *M. rubra* Howell, Erythea, 1: 38 (1893), type loc. Ore. and Wash. *Limnia rubra* Heller, Muhl. 6: 84 (1910).

8. *M. gypsophiloides* Howell. (Fig. 94.) Stems slender, erect or ascending, 2 to 9 inches high; herbage very pale and glaucous; basal leaves linear or filiform, the flowering stems 2 to several times as long; cauline pair ovate to linear-lanceolate, partially united on one side; raceme slender, elongated (half the height of the plant or more), the filiform pedicels becoming 2 to 8 lines long, spreading and often a little geniculate at the middle; flowers for their

size showy and most delicately beautiful; petals pink, cuneate-obovate, retuse, 3 to $3\frac{1}{2}$ lines long, about 3 times as long as the sepals.

Open summits and northward slopes or in moist thickets. Central Coast



Fig. 94. *MONTIA GYPSOPHILOIDES* Howell, x 1.

Ranges from the Mt. Hamilton Range north to Sonoma Co. Mar. to early May.

Locs.—Mt. Hamilton, *Jepson* 4223; Mt. Day, Santa Clara Co., *R. J. Smith*; Mt. Diablo, *C. F. Baker* 2817; Briones Hills, *Chandler* 588; Berkeley Hills, *Tracy* 1355; Mt. Tamalpais, *Jepson* 3111; Ft. Ross, *Heller*; Happy Valley, Sonoma Co., *M. S. Baker* 721; St. Helena and Calistoga, *Jepson*; Healdsburg, *Alice King*.

Refs.—*MONTIA GYPSOPHILOIDES* Howell, *Erythea*, 1: 38 (1893); *Jepson*, Fl. W. Mid. Cal. 186 (1901). *Claytonia gypsophiloides* F. & M. Ind. Sem. Hort. Petrop. 2: 33 (1835), Sert. Petrop. t. 35, type loc. Ft. Ross, Sonoma Co. (reprint, *Erythea*, 2: 139).

9. *M. spathulata* Howell. Caespitose, 1 to 6 inches high, the herbage glaucous and very fleshy; leaves narrowly or elongated linear or lanceolate, nearly as long as the flowering stems; cauline leaves linear or lanceolate, nearly dis-

tinet or somewhat connate upon one (rarely on both) sides, 4 to 10 lines long, nearly equaling to $\frac{1}{2}$ as long as the raceme; sepals rather less than 1 line long; petals somewhat quadrangular, retuse or rounded at apex, short-clawed, white or light pink, 2 to 3 lines long.

Common on open gravelly or rocky hill tops (often in vineyards and other cultivated areas). Coast Ranges mostly near the coast; south to Southern California; north to British Columbia. Not known in the Sierra Nevada. Feb.-Mar.

Locs.—Laguna Mt., San Diego Co., *Orcutt* 2046; Los Gatos, *Heller* 7290; San Francisco, *Jepson*; Berkeley Hills, *Tracy* 1355; Mt. Diablo, *C. F. Baker* 2816; Marin Co., *Brewer* 931; St. Helena, *Jepson*; Howell Mt., *Jepson* 514; Kelseyville, *Irwin*; Tehama Co., *Jepson*; Ft. Seward Ranch, *Jepson* 1903; Humboldt Bay, *Tracy* 3128; Yreka, *Butler* 678.

Refs.—*MONTIA SPATHULATA* Howell, *Erythra*, 1: 38 (1893); *Jepson* Fl. W. Mid. Cal. 186 (1893). *Claytonia spathulata* Dougl.; Hook. Fl. Bor. Am. 1: 226, t. 74 (1834), type spms. from the "Northwest Coast," *Menzies*, and n. Rocky Mts., *Douglas*. *Limnia spathulata* Heller, Muhl. 6: 84 (1910).

10. *M. exigua* Jepson n. comb. Similar to *M. spathulata* but looser and larger (2 to 6 inches high) and less glaucous; basal leaves about equaling the stems, elongated linear, or slightly spatulate, $\frac{1}{2}$ to 1 line broad; leaves of the cauline pair linear, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, distinct, or slightly connate on one side, usually much exceeding the raceme; petals white, 2 lines long, twice length of sepals.

Throughout California, but mostly towards the interior, the known stations few. At higher elevations than *M. spathulata*, which is of low hills near the coast. North to British Columbia. Lower California.

Locs.—Yreka, *Butler* 674; Howell Mt., *Jepson* 514; Mt. Diablo, *Brewer* 1082; Yosemite (Zoe, 4: 161); Santa Rosa Peak, *Jepson* 1447; San Diego, *Alderson* 328.

Var. *viridis* Jepson n. comb. Herbage green; cauline leaves lanceolate, nearly distinct.—Mountains of Southern California.

Locs.—Mt. San Antonio (Old Baldy), *Hall* 1245; Onstatt's Valley, Mt. San Jacinto, *Hall* 2218.

Refs.—*MONTIA EXIGUA* Jepson. *Claytonia exigua* T. & G. Fl. 1: 200 (1838), type spm. from California, *Douglas*. *Montia spathulata* var. *exigua* Rob. in Gray, Syn. Fl. 1: 275 (1897). *Claytonia tenuifolia* T. & G. Fl. 1: 201 (1838), type from California, *Douglas*. *C. spathulata* var. *tenuifolia* Gray, Proc. Am. Acad. 22: 282 (1887). Var. *viridis* Jepson. *Montia spathulata* var. *viridis* Davidson, Bull. S. Cal. Acad. 5: 61 (1906), type loc. Rock Creek, desert side of Mt. San Antonio, *Hasse & Davidson*.

11. *M. saxosa* Brandege. Stems numerous, caespitose, forming a dense succulent ball 1 to 2 inches in diameter; basal leaves obovate or spatulate, rounded at apex, 3 to 6 lines long, nearly sessile; cauline leaves a single pair, ovate, obtuse, not connate, 2 to 3 lines long; racemes umbellate, few-flowered, the pedicels equaling or exceeding the short scape-like stems; sepals roundish, 2 lines long, the roseate petals twice as long; capsules $1\frac{1}{2}$ to 2 lines long; seeds foveolate-striate.

Yollo Bolly Range, from North Yollo Bolly south to Snow Mt., about 7000 feet altitude.

Refs.—*MONTIA SAXOSA* Brandege; Gray, Syn. Fl. 1: 274 (1897). *Claytonia saxosa* Brandege, Zoe, 4: 150 (1893), type loc. Snow Mt., *Brandegee*. *Montia rosulata* Eastw. Proc. Cal. Acad. ser. 3, Bot. 1: 79 (1897), type loc. near Rock Spring, Mt. Tamalpais; basal leaves 5 to 10 lines long; flowers $1\frac{1}{2}$ to 2 lines across; petals white, oblong-obcordate. *Limnia rosulata* Heller, Muhl. 10: 84 (1910).

12. *M. sibirica* Howell. Stems erect, 9 to 18 inches high; root fibrous and annual with a thick crown, or the crown persistent as a short rootstock; basal leaves ovate or obovate to suborbicular, acuminate or acute, rarely obtuse, 1 to 2 inches long, on petioles 3 to 5 inches long; cauline pair similar, distinct, sessile or short-petioled; raceme very lax, 3 to 7 inches long, bracteate, the

flowers on long (1 to 2½ inches) pedicels; sepals orbicular to ovate, obtuse; petals white with pink veins or pink with rose-purple lines, coarsely notched, 3 to 5 lines long, narrowed at base into a distinct claw.

Swampy places along the coast. Marin Co. to Humboldt Co. and far north to Alaska. Feb.-June.

Locs.—Olema, *Jepson*; Bear Valley, Marin Co., *Davy* 700; Pt. Reyes, *Greene*; Stewarts Pt., *Baker*; Pt. Arena, *Bioletti*; Eureka, *Tracy* 2557; Arcata, *Chesnut & Drew*; near Buck Mt., Humboldt Co., *Tracy* 2860; Redwood Creek, Hupa Road, *Jepson* 1951; Highland Mine, Siskiyou Co., *Butler* 964; *Sisson, Jepson*.

Refs.—*MONTIA SIBIRICA* Howell, *Erythea*, 1: 39 (1893). *Claytonia sibirica* L. Sp. Pl. 204 (1753), "Sibiria"; *Jepson*, Fl. W. Mid. Cal. 186 (1901). Var. *bulbifera* Rob. Syn. Fl. 1: 273 (1897). *Claytonia bulbifera* Gray, Proc. Am. Acad. 12: 54 (1876), type loc. Scott Mts., *Greene*; thickened bases of leaves persistent on crown as bulblet scales. *Limnia bulbifera* Heller, Muhl. 6: 83 (1910).

13. **M. heterophylla** *Jepson* n. comb. Stems 5 to 11 inches high, rising from tuberous rootstocks or cormlets, these sending out slender stolons which produce terminal cormlets, the secondary cormlets promptly producing leaves and flowers; basal leaves narrowly ovate to oblanceolate, acute, ½ to 2 inches long, on long slender petioles; cauline pair similar, subsessile; raceme 5 to 11-flowered; pedicels becoming ¾ to 1 inch long; sepals round-ovate, obtuse or subcordate at base, 2 lines long; petals white, pink-veined, notched, twice as long as the sepals.

Southern Sierra Nevada, 5700 to 7000 feet. Oregon* to Alaska. The tubers or fleshy rootstocks each produce only 1 or 2 stems and leaves, whereas in *M. sibirica* the numerous leaves and stems form by their bases a thick crown on the slender or fibrous taproots.

Locs.—Freeman Creek, Tulare Co., *Jepson* 4884; Pine Ridge, Fresno Co., *Hall & Chandler* 304.

Refs.—*MONTIA HETEROPHYLLA* *Jepson*. *Claytonia unalaschensis* var. *heterophylla* Nutt.; T. & G. Fl. 1: 199 (1838), type loc. Oregon, *Nuttall*. *Montia sibirica* var. *heterophylla* Rob. in Gray, Syn. Fl. 1: 273 (1897).

14. **M. asarifolia** Howell. Stems erect, naked save for one cauline pair of leaves, 7 to 12 inches high, arising from a horizontal rootstock; basal leaves round-ovate, obtuse to acutish, ¾ to 1¾ inches long, on petioles 3 to 6 inches long; cauline pair similar, obtuse or often more acute; raceme loosely 3 to 8-flowered, the pedicels ½ to 1¼ inches long; sepals orbicular, truncate, 1½ to 2 lines long; petals white, merely retuse, 3 to 5 lines long.

High mountains, northern California. North to Alaska, east to northern Rocky Mts.

Locs.—Trinity Summit, *Manning*; w. Siskiyou Co., *Butler* 65 (Marble Valley), 1510 (Shackleford Creek).

Refs.—*MONTIA ASARIFOLIA* Howell, *Erythea*, 1: 39 (1893). *Claytonia asarifolia* Bong. Mem. Acad. St. Petersb. ser. 6, 2: 137 (1832), type loc. Sitka, Alaska. *Claytonia nevadensis* Brew. & Wats. Bot. Cal. 1: 77 (1876), type loc. northern Sierra Nevada, *Lemmon*.

4. **CLAYTONIA** Gron.

Low glabrous perennial herbs, the stems and basal leaves from globose deep-seated corms. Stems scape-like, bearing at summit a pair of opposite leaves and between them a several-flowered loose raceme. Flowers opening for more than one day. Sepals 2. Petals 5, distinct and equal. Stamens 5. Ovules few, about 6. Style-branches 3. Capsule 3-valved, 3 to 6-seeded.—Species about 8, North America and Asia. (Dr. John Clayton, American botanist, of the colony of Virginia, who furnished Gronovius the materials for the Flora Virginica; died 1773.)

1. **C. lanceolata** Pursh. Stems 1 to 24 from a corm, erect, 2 to 4 inches high; corm globose, about ½ inch in diameter; basal leaves few or rare, nar-

row, long-petioled; cauline leaves narrowly to oblong-lanceolate, sessile. 1 to 2 inches long; racemes 1, or sometimes 2 or 3, sessile or short-peduncled, 5 to 17-flowered, the pedicels bractless except the lowest; petals pink with darker veins, or nearly white, often with a yellow dot at base, emarginate or obtuse, 3 to 4 lines long; pedicels recurved in fruit.

Montane, 4500 to 7000 feet, northern Sierra Nevada north to Modoc Co., thence west to Humboldt Co. North to British Columbia and east to Utah.

Locs.—Cisco, *Kellogg*; Mt. Lassen, *Jepson* 4089; Susanville, *Austin & Bruce*; Forestdale, Modoc Co., *Baker*; Shackleford Cañon, w. Siskiyou Co., *Chandler*; Marble Mt., *Jepson* 2836 (sometimes with 6 petals and 6 stamens; one flower had 8 petals, 2 of them $\frac{2}{3}$ united, stamens 6); Trinity Summit, *Jepson* 2104.

Refs.—CLAYTONIA LANCEOLATA Pursh, Fl. 1: 175 (1814), type loc. Bitterroot Mts., Idaho, *Lewis*; Gray, Am. Jour. Sci. ser. 2, 33: 407 (1862). Var. *sessilifolia* Nelson, Bull. Torr. Club, 27: 259 (1900). *C. caroliniana* var. *sessilifolia* Torr.; Brew. & Wats. Bot. Cal. 1: 76 (1876).

5. LEWISIA Pursh.

Acaulescent fleshy perennials with very thick farinaceous roots bearing rosulate clusters of leaves and 1 to many-flowered scapes. Flowers often large and handsome. Sepals 2 to 8, herbaceous, persistent. Petals 5 to 16, varying from white to red. Stamens 5 to numerous. Style-branches 3 to 8, filiform, stigmatic their whole length. Capsule circumscissile near the base, the upper deciduous part more or less valvate-cleft from the base. Seeds several to many.—Species 11, western North America. (In honor of Capt. Lewis of the Lewis & Clark expedition across the continent, who collected the type species.)

The flower-parts in the species of this genus are very variable in number even on the same plant, more so than in any other genus of this family. The flower diagnoses which follow are chiefly based on notes made in the field, many counts having been made of flower parts on individual plants.

Sepals 2; flowers medium; scapes commonly bearing a cyme or panicle.—Subgenus OREOBROMA.

Stems from a small globose corm; leaves 2 or 3 below the inflorescence....1. *L. triphylla*.

Stems scape-like, leafless.

Scapes 1 to 4-flowered, with a pair of small bract-like leaves; root thick, fusiform to globose.

Leaves exceeding scapes; scapes 1 to 3-flowered.

Braets ovate, borne above the middle of scapes; sepals ovate, obtuse, glandular-denticulate2. *L. pygmaea*.

Braets linear, borne at surface of ground; sepals ovate, acute, entire, not glandular3. *L. nevadensis*.

Leaves shorter than the 2 to 4-flowered scapes; braets and sepals denticulate, not glandular4. *L. oppositifolia*.

Scapes bearing a panicle of numerous flowers; leaves in a tuft on the caudex crowning a thick fleshy root; braets and sepals ciliate-glandular.

Flowers 5 to 7 lines long; leaves narrowly linear.....5. *L. leana*.

Flowers $2\frac{1}{2}$ to 3 lines long; leaves spatulate-obovate.....6. *L. cotyledon*.

Sepals and sepal-like braets 4 to 8; flowers large; scapes 1-flowered.—Subgenus EULEWISIA.

Scapes jointed just beneath the calyx, with two braets at the joint which resemble the 2 sepals.

Sepals glandular-denticulate7. *L. kelloggii*.

Sepals not glandular-denticulate.....8. *L. brachycalyx*.

Scapes jointed above the middle, with an involucre of 5 to 7 scarious subulate braets; sepals 6 to 8.....9. *L. rediviva*.

1. *L. triphylla* Rob. (Fig. 95a.) Scape half underground, arising from a globose tuber about the size of a pea, 1 to 2 inches high and bearing a simple or compound umbellate raceme subtended by 3 or 2 narrowly linear leaves; umbel 3 to 14 (or 27) -flowered, or the flowers only 2 or 1; petals white, 5 to 7 or 10, subequal or unequal, $1\frac{3}{4}$ to 2 lines long; stamens 4 or 5; styles 5 (4 or 3).

Moist slopes or swales, in granite sand or fine gravel: Sierra Nevada and North Coast Ranges, 6000 to 9600 feet. North to Washington and Idaho.

Locs.—Middle Tule River, *Purpus* 1806; Alta Mdws., *K. Brandegee*; Mt. Silliman, *Jepson* 756; Pine Ridge, Fresno Co., *Hall & Chandler* 124; Yosemite Park, *Jepson* 4370 (Eagle Peak), 3231 (Vogelsang Pass), 3329 (Mt. Lyell, sepals not glandular), 3381 (Rodgers Creek); Lake Eleanor, *Chesnut & Drew*; Donner Lake, *Davy* 3203; Lassen Peak, *Jepson* 4098; Medicine Lake, *M. S. Baker*; ridge above Cudahay Valley, w. Siskiyou, *Jepson* 2853a; South Yollo Bolly, *Jepson*.

Refs.—*LEWISIA TRIPHYLLA* Rob. in Gray, *Syn. Fl.* 1¹: 269 (1897). *Claytonia triphylla* Wats. *Proc. Am. Acad.* 10: 345 (1875), type loc. northern Sierra Nevada. *Oreobroma triphylla* Howell, *Erythea*, 1: 33 (1893).



Fig. 95. *a*, *LEWISIA TRIPHYLLA* Rob. The leaves are nearly as often two as three. *b*, *LEWISIA NEVADENSIS* Rob. $\times 1$.

2. *L. pygmaea* Rob. Scapes several to many, 1 to 2 inches high, these and the leaves from a fleshy root; root elongated-fusiform, 3 to 6 lines thick; leaves linear, slightly exceeding the flowers; scapes one-flowered with a pair of ovate bracts above the middle, or umbellately 2-flowered and the pedicels subtended by the bracts; sepals ovate, obtuse, glandular-denticulate; petals white, 6 to 9, subequal or unequal, often notched on one side or at apex, 3 lines long; stamens 5 to 8; styles 3 to 5; scapes soon retrocurved.

Sierra Nevada, 8000 to 12,200 feet. North to Washington and east to the Rocky Mts.

Locs.—Mt. Guyot, Kern River, *Mary Haskell*; Mineral King, *T. Brandegee*; Mt. Silliman, *K. Brandegee*; Mt. Lyell, *Jepson* 3329; Mt. Dana, *Chesnut & Drew*; Bierstadt Peak, *Davy* 3191.

Refs.—*LEWISIA PYGMAEA* Rob. in Gray, Syn. Fl. 1st: 268 (1897). *Talinum pygmaeum* Gray, Am. Jour. Sci. ser. 2, 33: 407 (1862), type loc. South Clear Creek, Colo., Parry. *Calandrinia pygmaea* Gray; Brew. & Wats. Bot. Cal. 1: 75 (1876). *Oreobroma pygmaea* Howell, Erythea, 1: 33 (1893).

OREOBROMA LONGIPETALA Piper, Contrib. U. S. Nat. Herb. 16: 207 (1913). Scapes simple, or bearing 2 or 3 erect branches, much exceeding the leaves; petals 6 to 9 lines long.—“Sierra Nevada,” Lemmon. Ex. char.

3. ***L. nevadensis*** Rob. (Fig. 95b.) Scapes several to many, $\frac{1}{2}$ to 4 inches high, naked save for a pair of bracts near the middle—that is, near the surface of the ground; scapes and leaves arising from a fleshy carrot-shaped or sometimes globose root; bracts linear, opposite, often a little connate by their scarious bases; leaves narrowly linear or slightly broadened upward, 1 to $2\frac{1}{2}$ inches long, 1 to 2 lines broad, exceeding the scapes; flowers white, solitary and terminal on the stems; sepals ovate, acute; petals 6 to 8 (rarely 5), 6 to 7 lines long; stamens 6 to 11; styles 5 (3, 4 or 6); scapes retrocurving in fruit.

Granite sand, Sierra Nevada, 7000 to 11,000 feet. Not known in Southern California. North to Washington and east to Utah. June.

Locs.—Middle Tule River, Purpus 1805; Ramshaw Mdws., Kern Peak, Jepson 4962; Kaweah Peak, Jepson 5000; Shaver, Hall & Chandler 303 $\frac{1}{2}$; Yosemite Park, Jepson 4565 (Stubblefield Cañon), 3381 (Rodgers Creek); Donner Lake, Davy 3183; Gold Lake, Sierra Co., Hall & Babcock 4505; Forestdale, Modoc Co., M. S. Baker; Benton Mdws., Modoc Co., Austin & Bruce.

Refs.—*LEWISIA NEVADENSIS* Rob. in Gray, Syn. Fl. 1st: 268 (1897). *Calandrinia nevadensis* Gray, Proc. Am. Acad. 8: 623 (1873), type spms. from the Wahsatch, East Humboldt and Sierra Nevada mountains. *Oreobroma nevadensis* Howell, Erythea, 1: 33 (1893).

4. ***L. oppositifolia*** Rob. Scapes 1 to 3, erect or ascending, 6 to 8 inches high, these and the leaves from a fleshy-fusiform root, or 1 or 2 pairs of leaves on the lower part of the scape; leaves linear-oblancoelate or linear, 1 to 3 inches long; scapes naked or with 1 or 2 lanceolate bracts, bearing 2 to 4 umbellately disposed flowers on long ($\frac{1}{2}$ to $1\frac{1}{2}$ inches) pedicels; sepals 2 to 3 lines long, roundish, denticulate at the truncate or obtuse apex but glandless; petals white or pink, 6 to 7 lines long; stamens about 12.

Del Norte Co., California, to Josephine Co., Oregon.

Locs.—Smith River, acc. Watson; Waldo, Ore., (Erythea, 1: 32); Kerby to Josephine Creek, Ore., M. S. Baker.

Refs.—*LEWISIA OPPOSITIFOLIA* Rob. in Gray, Syn. Fl. 1st: 268 (1897). *Calandrinia oppositifolia* Wats. Proc. Am. Acad. 20: 355 (1885), type locs. Waldo, Ore., and near Smith River, Del Norte Co., Cal., Howell. *Oreobroma oppositifolia* Howell, Erythea, 1: 32 (1893).

5. ***L. leana*** Rob. Scapes few, 5 to 9 inches high, rising from a thick fleshy caudex, bearing a panicle of numerous flowers and a few scattered small bracts; leaves in a dense tuft crowning the caudex, narrowly linear, acute; more or less terete, 1 to $2\frac{1}{2}$ inches long and 1 to $2\frac{1}{2}$ lines wide; sepals ovate or roundish, 1 line long, fimbriate with reddish gland-tipped teeth; petals 5 to 7, red, $2\frac{1}{2}$ to 3 lines long; stamens 5 (or 4); scapes disarticulating from the caudex soon after flowering.

Siskiyou and Salmon mountains, and southern Sierra Nevada, 6000 to 9000 feet. Oregon.

Locs.—Fresno Co. (Woodchuck Peak, Eisen, Dinkey Creek, Hall & Chandler 398); Hennessey Trail, Mariposa Co., Congdon; Castle Lake near Mt. Shasta, Lemmon; Marble Mt., Chandler 1609; Shackleford Creek, Butler 1687; Twin Lakes, Cañon Creek, Trinity Co., Eastwood.

Refs.—*LEWISIA LEANA* Rob. in Gray, Syn. Fl. 1st: 269 (1897). *Calandrinia leana* Porter, Bot. Gaz. 1: 49 (1876), type loc. Siskiyou Mts., L. W. Lee. *Oreobroma leana* Howell, Erythea, 1: 31 (1893).

6. ***L. cotyledon*** Rob. (Fig. 96.) Scapes several from the leafy crown of a thick caudex, 4 to 10 inches high, bearing at summit a panicle and below the

panicle two pairs of bracts; bracts ovate, acute; leaves in a dense rosulate tuft, spatulate-obovate or -orbicular, $1\frac{1}{2}$ to 3 inches long; sepals roundish, very obtuse, glandular-denticulate, 2 to 3 lines long; petals 7 to 10, obovate or



Fig. 96. *LEWISIA COTYLEDON* Rob. *a*, plant, $\times \frac{1}{2}$; *b*, fully opened flower, $\times 1$.

oblanceolate, white, strongly pink-veined along the middle, 5 to 7 lines long; stamens 6 to 9; petals 8 or 9; filaments dilated below and connate into a sheath surrounding the ovary; style-branches 3 (or 2).

Western Siskiyou Co. and northern Trinity Co. A most attractive species. July.

Loes.—Preston Peak, *Howell*, June, 1884; Shackleford Cañon, *Jepson* 2817; Log Lake, *Butler* 1527; Highland Mine, *Butler* 960; Cañon Creek, Trinity Co., *Eastwood*.

The two following varieties occur very near the California boundary. Var. *purdyi* Jepson n. var. Leaves orbicular-oblancheolate, very short; bracts elliptic, obtuse. (Folia orbiculata-oblancheolata brevissima; bracteae ellipticae obtusae.)—Kerby, Josephine Co., Ore., acc. *Purdy*. Var. *howellii* Jepson n. comb. Leaves with crisped narrowly membranous edges.—Southwestern Oregon (Josephine Co., *Howell*, east to Grizzly Butte, Jackson Co., acc. *Purdy*).

Refs.—*LEWISIA COTYLEDON* Rob. in Gray, Syn. Fl. 1': 268 (1897). *Calandrinia cotyledon* Wats. Proc. Am. Acad. 20: 355 (1885), type loc. head of Illinois River, Siskiyou Mts., *Howell*. *Oreobroma cotyledon* Howell, Erythea, 1: 32 (1893). Var. *PURDYI* Jepson. *Lewisia purdyi* Jepson of the gardens. Var. *HOWELLII* Jepson. *Lewisia howellii* Rob. l. c. *Calandrinia howellii* Wats. 1. c. 23: 262 (1887), type loc. Deer Creek Mts., Josephine Co., Ore., *Howell*.

7. **L. kelloggii** K. Brandegee. Flowers and leaves densely crowded on the crown of a thick fleshy taproot; scapes very short, 3 to 7 lines long, jointed at the base, these and the petioles with loose transversely wrinkled whitish epidermis; leaves spatulate or obovate, obtuse, mostly notched at apex, 3 to 5 lines long, drawn down to a petiole as long or twice as long; sepals 4 (or 6), oblong or oblong-lanceolate, acute, minutely glandular-toothed, 3 to 4 lines long; petals 8 to 11, white, 2 to 3 times as long as the sepals; stamens 15 to 26 (or as few as "12"); style-branches 5 or "4"; capsule thin-walled, separating in a circumscissile manner from the receptacle at base, then splitting upwards into 2 (or "4 or 5") valves.

Northern Sierra Nevada, 4500 to 6000 feet, in sand on granite ridges or domes. On El Capitan, and doubtless generally, the plants barely push up through the granite sand, and the flowers open directly out on the surface of the sand, the cluster of rotately-spreading corollas forming a rosette which is very beautiful. Counts of flower parts were made by us on El Capitan in 1911. The sepals varied from 4 to 6, the petals from 7 to 11, and the stamens from 16 to 26. The style-branches were uniformly 5. The flowers do not disjoint from the plant in drying.

Loes.—American Valley, *R. M. Austin*; Big Mdw., *R. M. Austin*; Cisco, *Kellogg*; crown of El Capitan, Yosemite Valley, *Jepson* 4357.

Ref.—*LEWISIA KELLOGGII* K. Brandegee, Proc. Cal. Acad. ser. 2, 4: 88, pl. 4 (1893), type loc. Cisco, *Kellogg*.

8. **L. brachycalyx** Engelm. Scapes rather short, rising from a thickened caudex, surpassed by the moderately fleshy leaves; leaves in a spreading rosette, spatulate or oblanceolate, 1 to 4 inches long; sepals 4, ovate, acute, entire, 3 to 4 lines long; petals 5 to 9, white, $\frac{1}{2}$ to 1 inch long; stamens 10 to 15; style-branches 5 to 7.

Wet meadows, San Bernardino Mts., 6700 feet. Utah, Arizona and New Mexico.

Loc.—Bear Valley, San Bernardino Mts., *Parish* 2337, the only known station in Cal.

Refs.—*LEWISIA BRACHYCALYX* Engelm.; Gray, Proc. Am. Acad. 7: 400 (1868), type spms. from Utah, New Mex. & Ariz. *Oreobroma brachycalyx* Howell, Erythea, 1: 31 (1893).

9. **L. rediviva** Pursh. BITTER ROOT. Scapes from a thick caudex crowning a stout root, $\frac{3}{4}$ to 2 inches high, jointed near the middle and bearing an involucrel whorl of 5 or 7 scarious subulate bracts; leaves linear, thick, 1 inch long; sepals 6 to 8; petals 13 to 15 (or "16"), pink, bright rose or white, $\frac{3}{4}$ to 1 inch long, spreading rotately; stamens 40 to 47; filaments united at base; style-branches 6 to 8.

California, north to British Columbia and east to the Rocky Mts. Flowers disjointing readily at the middle of the scapes on drying. Apr.

Loes.—Coast Ranges: Mt. Pinos, *Hall* 6545; Santa Lucia Mts.; Pinnacles west of Hollister, acc. *Pieters*; Mt. Hamilton (Erythea, 1: 85); Mt. Diablo, *Jepson* 2640; Mt. Tamalpais, *M. L. Hutchinson*; near Sonoma, *Brewer* 976; Big Cañon, *Howell* Mt., *F. G. Hills* in litt.; Kelseyville, *Irwin*; Big Valley, Modoc Co., *M. S. Baker*. Southern California: Lytle Cañon, San Gabriel Mts., *Hall* 1461; Bear Valley, San Bernardino Mts. (*Zoe*, 4: 162).

Refs.—*LEWISIA REDIVIVA* Pursh, Fl. 2: 368 (1814), type loc. Lou Lou fork Bitterroot River, Mont., *Lewis*; Hook. f. Bot. Mag. t. 5395 (1863); Kelsey, Zee, 3: 109 (1892); Jepson, Fl. W. Mid. Cal. 185 (1901); Piper, Contrib. U. S. Nat. Herb. 11: 246 (1906); Heller, Muhl. 5: 15 (1909). *L. alba* Kell. Proc. Cal. Acad. 2: 115, fig. 36 (1861). Var. *YOSEMITANA* K. Brandegee, Proc. Cal. Acad. ser. 2, 4: 89 (1894), type loc. "somewhere about Yosemite Valley, Mrs. W. F. Dodd." Peduncles jointed below the flower and crowned by 3 scarious bracts; sepals 2, broad, emarginate; petals 5.—Ex. char.

6. PORTULACA L.

Fleshy herbs, ours annuals, with alternate leaves and yellow flowers. Calyx 2-cleft, the tube adnate to the ovary below. Petals 5 (rarely 6), inserted with the stamens on the calyx. Stamens 7 to 20. Style mostly 3 to 8-parted. Capsule globose, opening transversely, the upper part coming off like a lid. Seeds many.—Species about 20, mainly tropical and subtropical regions, all continents. (Old Latin name.)

1. *P. oleracea* L. COMMON PURSLANE. Stems 4 to 8 inches long; herbage glabrous; leaves euneate or obovate; flowers sessile, opening only in sunshine: petals notched or 2-lobed.

Frequent in low lands throughout the state. Introduced from tropical America. June-Oct.

Loes.—Yreka, *Butler* 1061; Hy-am-pum, *Chesnut & Drew*; Kelseyville, *Jepson*; Berkeley, *Alice King*; Lathrop, *Harriet Walker*; Porterville, acc. *Hilgard*; Los Angeles (*Erythraea*, 1: 58).

Refs.—*PORTULACA OLERACEA* L. Sp. Pl. 445 (1753); Jepson, Fl. W. Mid. Cal. 184 (1901).

P. RETUSA Engelm. in Gray, Pl. Lindh. 2: 154 (1850), type loc. western Texas, *Lindheimer*. Ascending; leaves often retuse; petals small or minute; seeds echinate.—Texas to Arizona. To be expected on the California side of the Colorado River.

CARYOPHYLLACEAE. PINK FAMILY.

Herbs of inert properties, with commonly swollen nodes, simple and entire leaves always opposite, and regular perfect flowers. Calyx persistent. Corolla white, red or pink. Sepals and petals 5 (or 4), the stamens as many and alternate with the petals, or twice as many, rarely fewer. Ovary superior, 1-celled (imperfectly 3-celled in some *Silene*), with 1 to 5 styles and 1 to many ovules on a free central placenta. Fruit a few to many-seeded 1-celled capsule deliscent at the summit by short valves or teeth (these as many or twice as many as the carpels), or 1-seeded and indehiscent, thus becoming an achene or utricle. Embryo commonly curved around the periphery of the seed, the endosperm occupying the center.—Species about 1300 in 76 genera, mostly temperate regions but occurring in all zones and all continents.

Bibliog.—Rohrbach, Paul, Monog. Gatt. *Silene*, 1-250, t. 1-2 (1868). Watson, S., Western Species of *Silene* (Proc. Am. Acad. 10: 340-44,—1875). Hollick & Britton, *Cerastium arvense* L. and its N. Am. Varieties (Bull. Torr. Club, 14: 45-51, pls. 63-65,—1887). Britton, N. L., N. Am. Species of *Tissa* (Bull. Torr. Club, 16: 125-129,—1889). Robinson, B. L., The N. Am. *Sileneae* and *Polycarpeae* (Proc. Am. Acad. 28: 124-155,—1893); The N. Am. *Alsineae* (l. c. 29: 273-313,—1894). Williams, F. N., On the Genus *Arenaria* (Bull. Herb. Boiss. 3: 593-603,—1895); Rev. of *Arenaria* (Jour. Linn. Soc. Bot. 33: 326-437,—1898); Rev. of *Silene* (l. c. 32: 1-196,—1896); Primary Subdivisions in the Genus *Silene* (Jour. Bot. 32: 10-13,—1894); On Primary Characters in *Cerastium* (l. c. 36: 8-10,—1898); An Account of *Velezia* (l. c. 37: 25-34,—1899). Fernald, M. L., & Wiegand, K. M., Some Northeastern Species of *Spergularia* (Rhod. 12: 157-163,—1910). Fernald, M. L., The Am. variations of *Stellaria borealis* (Rhod. 16: 144-151,—1914).

A. Sepals distinct or united only at base.

Petals spreading, without claws or appendages, or in a few species wanting; ovary not stipitate; fruit a capsule; low herbs.

Styles 3 to 5, distinct; petals present, mostly conspicuous (for the choripetalous genera).

—Tribe *ALSINEAE*.

Stipules none.

- Petals bifid or 2-divided, rarely none; styles 3, 4 or 5, when of the same number as the sepals opposite them.
- Capsule cylindric, usually conspicuously elongated and often curved; styles commonly 5, opposite the sepals.....1. CERASTIUM.
- Capsule ovoid or oblong, relatively short; styles 3 (or 4).....2. STELLARIA.
- Petals entire or merely notched, rarely none.
- Styles as many as the sepals and alternate with them.....3. SAGINA.
- Styles fewer than the sepals.....4. ARENARIA.
- Stipules present, scarious (setaceous in no. 8); petals entire.
- Styles 3; leaves opposite5. SPERGULARIA.
- Styles 5; leaves apparently whorled.....6. SPERGULA.
- Style 1, 3-cleft or -toothed; petals minute or none.—Tribe POLYCARPEAE.
- Leaves opposite or in 4s, oblong or obovate.....7. POLYCARPON.
- Leaves opposite, subulate, cuspidate.....8. LOEFLINGIA.
- Petals none or represented by mere filament-like organs; style 1, 2-cleft or -parted, rarely 3-cleft, or styles 2; fruit a utricle or achene; very small or prostrate herbs.—Tribe ILLECEBREAE.
- Sepals distinct or nearly so; stipules present.
- Annual; stipules and flowers minute.....9. HERNIARIA.
- Perennial; stipules conspicuous, silvery-scarious.
- Leaves subulate; sepals very unequal, armed with a divergent spine.....10. PENTACAENA.
- Leaves oblanceolate; sepals equal, cuspidate.....11. PARONYCHIA.
- Sepals united below into a short tube.
- Stipules present.
- Staminodes without glands; annual.....12. ACHYRONYCHIA.
- Staminodes with glands; perennial.....13. EREMOLITHIA.
- Stipules none; low annual.....14. SCLERANTHUS.

B. Sepals united into a tubular calyx.

- Petals with conspicuous claws, these with the stamens and ovary frequently raised above the base of the calyx on a stipe; styles distinct; fruit a capsule; stipules none; mostly erect and often tall herbs.—Tribe SILENEAE.
- Calyx teeth much shorter than the tube.
- Styles 2; capsule opening by 4 short teeth.
- Flowers showy.
- Calyx ovate, with 5 prominent angles; petals not appendaged...15. VACCARIA.
- Calyx tubular, not angled; petals with scales.....16. SAPONARIA.
- Flowers minute; calyx narrow-cylindric, about 15-ribbed.....17. VELEZIA.
- Styles 3; capsule opening by 3 or 6 teeth or valves; claw of the petals commonly bearing scales or appendages at its junction with the blade...18. SILENE.
- Calyx teeth longer than the tube; styles 5; capsule opening by 5 teeth...19. AGROSTEMMA.

1. CERASTIUM L. MOUSE-EAR CHICKWEED.

Pubescent herbs with white flowers. Cymes dichotomous with herbaceous or scarious bracts. Sepals 5. Petals 5, retuse or bifid. Stamens 10 or 5. Styles 5. Capsule elongated, cylindric, often curved, usually much exceeding the calyx, dehiscent at apex by 10 teeth, these erect or spreading. Seeds rough, more or less flattened.—Species about 100, all continents except Australia. (Greek *keras*, a horn, in allusion to the elongated curved capsules.)

Petals shorter than or about equaling the sepals.

- Annual; pedicels not longer than the flowers.....1. *C. viscosum*.
- Perennial; pedicels longer than the flowers.....2. *C. vulgatum*.
- Petals twice as long as sepals; perennial.....3. *C. arvense*.

1. *C. viscosum* L. MOUSE-EAR CHICKWEED. Erect, 3 to 10 (or 15) inches high, pilose-hirsute and somewhat glandular, especially on the calyx; leaves ovate to elliptic-oblong, sessile, slightly connate, 7 to 12 lines long; pedicels not longer than the sepals; petals equaling or distinctly shorter than the sepals, oblong, bifid at apex, 2 lines long; stamens 10, one or more with reduced or abortive anthers, or sometimes only 5 with anthers, the other 5 represented by mere scale-like filaments; capsule tubular, 4 lines long, about twice as long

as the calyx, the slightly curved apex contracted; seeds numerous, minutely muriculate.

Common in fields and by roadsides. Mar.-Apr. Naturalized from Europe.

Refs.—*CERASTIUM VISCOSUM* L. Sp. Pl. 437 (1753), type European; Jepson, Fl. W. Mid. Cal. 166 (1901).

2. *C. vulgatum* L. Biennial or perennial; stems erect or ascending, 9 to 13 inches high; herbage hairy-pubescent throughout and somewhat viscid; lower leaves spatulate-oblong, upper oblong, 5 to 10 lines long; flowers loosely cymose, the pedicels as long as or at length exceeding the calyx; bracts scarious-margined; sepals 2 to 2½ lines long, about as long as the 2-cleft petals; capsule curved upward, 2 to 3 times as long as the calyx.

Sparingly naturalized from Europe.

Locs.—Plumas Co. (acc. Wats. Bot. Cal. 2: 434); Eureka, Tracy 2569 in 1907; Berkeley, in lawns; Los Angeles, in lawns (Davidson, Pl. L. A. 4).

Refs.—*CERASTIUM VULGATUM* L. Sp. Pl. ed. 2, 627 (1762), type European. *C. triviale* Link, Enum. Hort. Ber. 1: 433 (1821).

3. *C. arvense* L. FIELD CHICKWEED. Stems from running rootstocks, several from a decumbent very leafy and often matted base, nearly naked above, 5 to 9 inches high; herbage pubescent and often glandular, the pedicels and calyx glandular-pubescent; leaves linear, acute, the upper 1 to 1½ inches long, the lowermost often but half as long; cyme contracted, bearing 1 to 6 flowers; sepals 1½ to 2½ lines long, scarious-margined; petals usually twice as long as the calyx, obcordate, deeply notched; capsule scarcely exceeding the calyx, pendulous on the curved end of the pedicel.

Sierra Nevada and in the Coast Ranges as far south as San Francisco. North America, Europe.

Locs.—Coast Ranges: Mission Hills, San Francisco, Chesnut; Sausalito, Chesnut & Drew; Cazadero, Dary 1664; Ft. Bragg, Margaret Armstrong; Hupa, Mary H. Manning. Sierra Nevada: Vernal Fall, Yosemite, Jepson 3138.

Var. *maximum* Holl. & Britt. Stout, tall, 1 to 2 feet high; leaves elongated; cyme ample, spreading, 10 to 18-flowered; capsule equaling to nearly twice the length of the calyx.—Marin Co. north to Humboldt Co.

Locs.—Hupa, Chandler 1384; Eureka, Tracy 2515; Eel River, Humboldt Co., Bolander 6520; Harris, Humboldt Co., Jepson 1883; Noyo, Bolander 4723.

Refs.—*CERASTIUM ARVENSE* L. Sp. Pl. 438 (1753), type European. Var. *MAXIMUM* Holl. & Britt. Bull. Torr. Club, 14: 47 (1887), type spms. from northern California coast (Noyo, San Francisco, etc.). *C. maximum* Heller, Muhl. 1: 50 (1904).

C. ALPINUM L. var. *FISCHERIANUM* T. & G. Fl. 1: 188 (1838). *C. fischerianum* Ser.; DC. Prod. 1: 419 (1824), type loc. Kamchatka. Leaves rather thick, elliptic- or oval-lanceolate; approaches *C. arvense* var. *maximum* very closely.—Humboldt Co. (acc. Gray, Syn. Fl. 1: 231).

2. *STELLARIA* L. CHICKWEED.

Low slender mostly glabrous herbs, loving moist ground or shaded habitat. Flowers white, small, axillary and solitary, or terminal and cymose. Sepals 5, acute or acuminate. Petals 5, parted almost to the base into narrow segments. Stamens 3 to 10. Styles 3 or 4. Capsule ovoid or oblong, relatively shorter than in *Cerastium*, dehiscent to below the middle into as many or twice as many valves as there are styles.—Species about 100, all lands. (Latin *stella*, a star, the flowers star-shaped.)

A. Annual; lower leaves ovate, petioled.

Bracts foliaceous; stems procumbent, weak.....1. *S. media*.
Bracts scarious; stems filiform, erect.....2. *S. nitens*.

B. Perennial; leaves ovate, lanceolate, or linear, all sessile or nearly so.

Petals deeply 2-parted; herbage not glandular.

Bracts small and scarious.

Petals minute or none; flowers in umbels.....3. *S. umbellata*.

Petals longer than the sepals; flowers irregularly cymose, the cymes terminal, often reduced to a single long-pediceled flower.....4. *S. longipes*.

Bracts foliaceous.

Leaves shorter than internodes; petals shorter than the sepals or none.

Flowers cymose; leaves mostly lanceolate.....5. *S. borealis*.

Flowers solitary in the axils; leaves ovate.....6. *S. crispa*.

Leaves longer than internodes; petals equaling or slightly exceeding sepals; seashore species.....7. *S. littoralis*.

Petals merely retuse or bifid, exceeding the calyx; herbage glandular-pubescent.....8. *S. jamesiana*.

1. ***S. media*** Cyr. COMMON CHICKWEED. Slightly succulent, with weak procumbent stems, rooting at the lower nodes; lower leaves ovate, acute, rather abruptly contracted into slender petioles, the upper narrower, sessile; floral bracts foliaceous; pedicels slender, deflexed in fruit; petals shorter than the pubescent sepals; stamens 3, 5 or 10; capsule ovoid, slightly exceeding the calyx.

Introduced from Europe. Common weed along fence lines and ditches and shaded half-waste places generally. Feb.-May. Stems with a pubescent line, and petioles of lower leaves hairy.

Refs.—*STELLARIA MEDIA* Cyr. Char. Comm. 36 (1784); Jepson, Fl. W. Mid. Cal. 167 (1901). *Alsine media* L. Sp. Pl. 272 (1753), type European.

2. ***S. nitens*** Nutt. SHINING CHICKWEED. Stems erect, filiform, branching above, 3 to 7 (or 10) inches high, glabrous or slightly hairy below; leaves linear, acute, sessile, 2 to 7 lines long, or the very lowest ovate, 1 to 3 lines long, abruptly contracted into slender petioles nearly twice as long; inflorescence strict, the pedicels erect, $\frac{3}{4}$ inch long or less, or some of the flowers quite sessile; bracts scarious; sepals scarious-margined, subulate-lanceolate, 2 lines long; petals $\frac{1}{2}$ as long as the sepals, sometimes none; capsule oblong, nearly as long as the calyx.

Grassy hillsides and plains, a somewhat obscure plant. Coast Ranges, Great Valley and Sierra Nevada foothills, south to the hills of Southern California from the coast to the inner ranges. North to British Columbia and east to Utah. Apr.-May.

Locs.—Yreka, Butler 1158; Humboldt Bay, Tracy 3126; Vaca Mts., Jepson; Araquipa Hills, Solano Co., Jepson 528; San Jose, A. E. Bush; Greenhorn Pass, Purpus 5699; San Bernardino, Parish; Witch Creek, San Diego Co., Alderson.

Refs.—*STELLARIA NITENS* Nutt.; T. & G. Fl. 1: 185, 675 (1838), type loc. Columbia River plains, Nuttall; Jepson, Fl. W. Mid. Cal. 167 (1901). *Alsine nitens* Greene, Man. Bay Reg. 33 (1894).

3. ***S. umbellata*** Turcz. Stems slender, weak, ascending from a rooting base, 3 to 10 inches high; herbage glabrous; leaves ovate to oblong or those above the base oblong-lanceolate, acute, 4 to 8 lines long; flowers in regular or more or less irregular umbels, the umbels terminal on the stem or forks of the cyme; pedicels $\frac{1}{2}$ to $1\frac{1}{4}$ inches long; sepals $\frac{3}{4}$ to 1 line long; petals minute or none; capsule twice as long as the calyx.

Rare, southern Sierra Nevada, 7000 to 8000 feet. East to the Rocky Mts. Eastern Siberia.

Locs.—Soda Springs, Tuolumne Mdns., Congdon; Perego's Mdw., near Yosemite (acc. Gray, Bot. Cal. 1: 69); near Mineral King (acc. Coville); White Mts. (acc. Coville).

Refs.—*STELLARIA UMBELLATA* Turcz. Bull. Soc. Nat. Mosc. 89 (1838), nomen; 15: 173 (1842), type Siberian. *Alsine baicalensis* Cov. Contrib. U. S. Nat. Herb. 4: 70 (1893).

4. ***S. longipes*** Goldie. (Fig. 97a, b.) Stems strictly erect, 5 to 12 inches high, from slender running rootstocks; at high altitudes dwarfish and densely matted; herbage glabrous; lower leaves oblong to linear, 3 to 6 lines long, or the upper linear-lanceolate, 6 to 10 lines long; flowers solitary and terminal, or in irregular terminal cymes, the pedicels of variable length ($\frac{1}{4}$ to $1\frac{1}{2}$ inches

long) but commonly strictly erect; calyx $1\frac{1}{2}$ to 2 lines long; petals cleft nearly to the base, equalling or exceeding the sepals; capsule dark or black, exceeding the calyx; seed microscopically and scantily puberulent, nearly smooth.

Common in moist often grassy places in the mountains, 4300 to 8500 feet.

Locs.—Bear Valley, San Bernardino Mts., *Parish* 3346; Mineral King, *G. W. Purdy*; meadows on Volcano Creek, Tulare Co., *Jepson* 4959, 4928; Bubbs Creek, *Jepson* 788; Pine Ridge, Fresno Co., *Hall & Chandler* 170; Yosemite Valley, *Jepson*; Piute Creek, Yosemite Park, *Jepson* 3401; Lundy, Mono Co., *Maud Minthorn*; Deer Park, Placer Co., *C. J. For, Jr.*; Little Truckee, *Doten*; Big Mdw., Plumas Co., *R. M. Austin, Jepson* 4054; Ft. Bidwell, *Mary H. Manning* 144; Bear Flat, n.e. Shasta Co., *Hall & Babcock* 4158; Quartz Valley, Siskiyou Co., *Butler* 1463; South Yollo Bolly, *Jepson*.

Var. *laeta* Wats. Herbage glaucous.—Long Mdw., Volcano Creek, *Jepson* 4961. Also far northward.

Refs.—*STELLARIA LONGIPES* Goldie, *Edinb. Phil. Jour.* 6: 327 (1822), type loc. near Lake Ontario, Canada. *Alsine longipes* Cov. *Contrib. U. S. Nat. Herb.* 4: 70 (1893). Var. *LAETA* Wats. *Bibl. Index*, 112 (1878). *Stellaria laeta* Rich.; Franklin's 1st Journ. App. 7, ed. 1, 738 (1823), loc. class. "barren grounds from Point Lake to the Arctic Sea."



Fig. 97. *a*, *STELLARIA LONGIPES* Goldie, terminal portion of flowering branch, x 1. *b*, petal, x 2. *c*, *STELLARIA JAMESIANA* Torr.; terminal portion of flowering branch, x 1.

5. *S. borealis* Bigel. Stems erect or spreading, weak, sparingly branched, 6 to 10 inches long; herbage glabrous; leaves ovate to elliptic-ovate, or acute, 3 to 5 lines long, sometimes a little crisped; flowers in loose terminal leafy

cymes, or often solitary in the lower forks or rarely in the lower leaf axils, on pedicels 2 to 4 or 8 lines long; sepals $1\frac{1}{2}$ to 2 lines long, the petals shorter or wanting; capsule greenish or brownish, oblong, nearly a half longer than the calyx; seed microscopically roughened.

Alpine or subalpine, in wet or cool places. 9000 to 12,000 feet: North Coast Ranges; southern Sierra Nevada; San Bernardino Mts. North to Alaska, thence around the earth. In typical form rare in California, the variety being far more common.

Locs.—South Yollo Bolly, *Jepson*; doubtless Mt. Shasta (cf. Rob. in Gray, Syn. Fl. 1¹: 236, as *S. calycantha*); Medicine Lake, Siskiyou Co., *M. S. Baker* 487; Kaweah Peak, *Jepson* 5003; South Fork Santa Ana River, *Wüder*.

Var. *bongardiana* Fern. Stems 10 to 17 (or 30) inches long; leaves ovate-lanceolate, acuminate, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, 1 to 2 (or 3) lines broad; pedicels $\frac{3}{4}$ to $1\frac{1}{2}$ inches long.—North Coast Ranges, near the coast; Sierra Nevada, 4000 to 6000 or 8500 feet; Mt. San Jacinto. North to Alaska, thence east to New England.

Locs.—North Coast Ranges: Noyo, Mendocino Co., *Bolander* 4718; Ft. Bragg, *Bolander* 6518; Eureka, *Tracy* 795; Van Duzen River Valley, *Tracy* 2884. In the Sierra Nevada the leaves are usually broader (3 to 5, rarely 10, lines broad) and a few on a stem are often crisped, but so are they slightly in coast specimens. Round Mdw., Giant Forest, *Jepson* 683 (sometimes 4-merous with 4 styles); General Grant Grove, *T. Brandegee*; Pine Ridge, Fresno Co., *Hall & Chandler* 151; Yosemite Valley, *Hall*.

Refs.—*STELLARIA BOREALIS* Bigel. Fl. Bost. ed. 2, 182 (1824), type loc. White Mts., New Hampshire; Fern. Rhod. 16: 144 (1914). *Alsine borealis* Britton, Mem. Torr. Club, 5: 149 (1894). *Stellaria calycantha* Bong. Veg. Sitka, 127 (1832), type loc. Sitka, *Bongard*. Var. *BONGARDIANA* Fern. Rhod. 16: 151 (1914). *Stellaria longifolia* Bong. l. c. 126, type loc. Sitka, *Bongard*; not Muhl.

6. *S. crispa* C. & S. Stems ascending or reclining, 4 to 15 inches long, simple above the base or sparingly branched; herbage glabrous; leaves rather remote, ovate, abruptly short acuminate or very acute, usually crisped on the edges, 2 to 6 (or 9) lines long; flowers solitary in the axils (at every other node or more scattered), on pedicels 3 to 5 lines long; pedicels erect, or often spreading or deflexed in fruit, about half the length of the internode; calyx $1\frac{1}{2}$ lines long; petals divided, equaling the sepals or shorter, or none; capsule straw-colored, $\frac{1}{2}$ longer than the calyx.

Grassy wet meadows, North Coast Ranges. North to Alaska. May-July.

Locs.—Olema, Marin Co., *Davy* 4343; Hydesville, *Tracy* 2438; Eureka, *Tracy* 914; Willow Creek, Trinity River, *Tracy* 3312; Mt. Shasta, acc. *Merriam*.

Refs.—*STELLARIA CRISPA* C. & S. Linnaea, 1: 51 (1826), type loc. Unalaska. *Alsine crispa* Holz. Contrib. U. S. Nat. Herb. 3: 216 (1895); *Merriam*, N. Am. Fauna, 16: 145 (1899).

7. *S. littoralis* Torr. Stems stoutish, ascending, very leafy, 1 to 2 feet long; herbage weakly pubescent; leaves rather crowded, ovate, acute, rounded at the sessile base, $\frac{3}{4}$ to $1\frac{3}{4}$ inches long; flowers in a terminal compound leafy cyme; pedicels 3 to 5 (or those in the lower forks 7 to 10) lines long; sepals lanceolate, acute, 2 lines long, slightly shorter than the deeply cleft petals; capsule included within the calyx.

Bogs or marshes, seacoast only, from San Francisco north to Humboldt Co. May-June.

Locs.—Cliff House, *Drew*; Pt. Lobos, *Michener & Bioletti*; Pt. Reyes, *Davy* 6731; Bodega Pt., *Eastwood*; Trinidad, *Tracy* 2968.

Refs.—*STELLARIA LITTORALIS* Torr. Pac. R. Rep. 4: 69 (1857), type loc. Pt. Reyes, *Bigelow*; *Jepson*, Fl. W. Mid. Cal. 167 (1901). *Alsine littoralis* Greene, Man. Bay Reg. 34 (1894).

8. *S. jamesiana* Torr. (Fig. 97c.) Stems diffuse, 5 to 12 inches high, from slender rootstocks, often with fusiform-thickened joints; herbage minutely glandular puberulent; leaves narrowly lanceolate to ovate or broadly lanceolate, $1\frac{1}{4}$ to 2 (or 3) inches long, the pairs horizontally spreading; flowers in

loose terminal or axillary cymes on spreading peduncles; peduncles 1 to 2 inches long; pedicels 4 to 10 lines long; sepals $1\frac{1}{2}$ to 2 lines long, the petals twice as long, broadly notched at apex; capsule ovate, shorter than the calyx.

Meadows or pine forest, 5000 to 8500 feet: Sierra Nevada south to Frazier Mt.; North Coast Ranges. East to the Rocky Mts. and north to Washington.

Locs.—Frazier Mt., Ventura Co., Hall 6606; Sand Mdw., South Fork Kaweah River, Jepson 4687; Hossack Creek, e. Tulare Co., Hall 8347; Round Mdw., Giant Forest, Jepson 681; Pine Ridge, Fresno Co., Hall & Chandler 62; Alder Creek, Yosemite Park, Jepson (count of stamens in four flowers, 5, 6, 6, 10); Morgan, Tehama Co., Hall & Babcock 4335; Plumas Co., Platt; Susanville, T. Brandegee; Modoc Co., M. S. Baker; Moffitt Creek, Siskiyou Co., Butler 966.

Refs.—STELLARIA JAMESIANA Torr, Ann. Lye. N. Y. 2: 169 (1828), type loc. Rocky Mts. *S. jamesii* Torr. Pac. R. Rep. 4: 69 (1857). *Alsine jamesiana* Heller, Cat. ed. 2, 4 (1900). *A. glutinosa* Heller, Bull. S. Cal. Acad. 2: 67 (1903), type loc. Summit Lake, Mt. Sanhedrin, Heller 5880.

3. SAGINA L. PEARLWORT.

Diminutive herbs with subulate or filiform leaves. Leaves of the opposite pairs scarious-connate at base. Flowers minute, terminal, often long-pedicel. Sepals 5 or 4, obtuse. Petals white, much shorter than the sepals, rarely subequal, mostly minute, entire or slightly emarginate, or sometimes none. Stamens 5 or 10. Styles as many as the sepals and alternate with them. Capsule dehiscent to the base by entire valves.—Species about 20, all continents. (Latin *sagina*, fattening, some species abundant in sheep-grazed country.)

Filiform annuals; pedicels straight; low altitudes.

Sepals and petals 5; connate bases of leaves glabrous.....1. *S. occidentalis*.

Sepals 4; petals commonly none; connate bases of leaves ciliolate.....2. *S. apetala*.
More or less succulent, wholly glabrous; biennial or perennial.

Petals mostly $\frac{1}{2}$ length of sepals; pedicels curved at summit; high altitudes.....

3. *S. linnaei*.

Petals and sepals subequal; pedicels rarely curved at summit; seashore.....

4. *S. crassicaulis*.

1. *S. occidentalis* Wats. WESTERN PEARLWORT. Inconspicuous annual with almost capillary stems, branching at the base, erect or spreading, 2 to 5 inches high; slightly hispidulous-glandular on the calyx and upper portion of pedicel, otherwise glabrous; upper leaves broadly subulate, acute, 2 to 3 lines long, the lower filiform-linear, 3 to 6 lines long; pedicels 3 to 6 lines long; sepals and petals 5; sepals $\frac{3}{4}$ line long, the petals nearly as long; calyx rounded at the base; stamens 3 to 10; capsule $1\frac{1}{4}$ lines in length.

Not uncommon, but obscure and mostly in low ground or borders of salt marshes: Coast Ranges and Great Valley, south to coastal Southern California, north to Siskiyou Co. Far north to British Columbia. Apr.-May.

Locs.—Eureka, Tracy 2181; Comptche, Harriet Walker 304; Ukiah, Bolander 3891 (part of type); Vacaville, Jepson 1205a; Montezuma Hills, Jepson; Oakville, Napa Valley, Jepson; Stege, Tracy 610; Berkeley, Jepson; Santa Inez Mts., Brewer 339 (part of type); Pasadena McClatchie.

Refs.—SAGINA OCCIDENTALIS Wats. Proc. Am. Acad. 10: 344 (1875), type spms. from "Oregon to San Francisco"; Jepson, Fl. W. Mid. Cal. 169 (1901); Parish, Zoe, 4: 162 (1893). *Alsinella occidentalis* Greene, Fl. Fr. 125 (1891). The distinctness of this species and *S. crassicaulis* has been questioned (Piper, Contrib. U. S. Nat. Herb. 11: 259), but altho *Sagina* is a genus of poorly defined species these two are widely unlike and in respect to each other stand most securely.

2. *S. apetala* Ard. var. *barbata* Fenzl. Tiny annual, erect, 1 to 2 inches high, usually minutely glandular-pubescent; leaves linear-subulate, acute, $1\frac{1}{2}$ to 3 lines long, the connate scarious bases more or less ciliolate; pedicels capillary, erect; calyx 4-parted; petals commonly none, or 4, minute and obovate; capsule ovoid, $1\frac{1}{2}$ times as long as the calyx.

About ranches or near dwellings, therefore probably introduced. Seldom collected but perhaps overlooked.

Locs.—Tehama Co., *Jepson* in 1899; Jackson, *Hansen* in 1892.

Refs.—*SAGINA APETALA* Ard. Animad. Bot. Sp. Alt. 22, t. 8 (1763). Var. *BARBATA* Fenzl; Ledeb. Fl. Ross. 1: 338 (1842), type loc. Russia. *S. apetal*a *Jepson*, Fl. W. Mid. Cal. 169 (1901). *Alsinella ciliata* Greene, Fl. Fr. 126 (1891), type loc. Ione. *Sagina ciliata* Heller, Muhl. 1: 50 (1904).

3. ***S. linnaei*** Presl. ARCTIC PEARLWORT. Biennial or perennial; stems numerous, forming a close mat, 1 to 3 inches high, often with leaf-rosettes at base; herbage glabrous; leaves thickish, linear, 3 to 5 or 8 lines long; pedicels filiform, commonly recurved at summit; stamens 10; petals $\frac{1}{2}$ to $\frac{3}{4}$ the length of the sepals; capsule ovate-conic, $\frac{1}{3}$ to 2 times length of the calyx.

High wet meadows or on rocks, 4000 to 11,000 feet: Sierra Nevada; San Bernardino and San Jacinto mountains; North Coast Ranges. North to Alaska, thence around the earth. June-July.

Locs.—Mt. San Jacinto, *Hall* 2203; Bluff Lake, San Bernardino Mts., *Parish* 3605; Kings Cañon, *Jepson* 769; Bullfrog Lake, *Jepson* 843; Pine Ridge, Fresno Co., *Hall & Chandler* 135; Yosemite, *Hall* 8879; Woolly Creek, w. Siskiyou, *Butler* 48; South Yollo Bolly, *Jepson*.

Refs.—*SAGINA LINNAEI* Presl. Rel. Haenk. 2: 14 (1835). *Spergula saginoides* L. Sp. Pl. 441 (1753), type Europo-Asiatic. *Sagina saginoides* Britt. Mem. Torr. Club, 5: 151 (1894).

4. ***S. crassicaulis*** Wats. Glabrous perennial, the stems stoutish and succulent, branching, 1 to 5 inches long, decumbent; leaves linear, thickish, 2 to 9 lines long, the basal forming a rosette, the cauline connate by broad scarious membranes; flowers erect or nodding; petals and sepals subequal, $1\frac{1}{2}$ lines long; stamens 10; capsule ovate, little exerted from the fruiting calyx.

Beaches along the coast from Monterey to Tomales Bay. Washington and British Columbia. June-July.

Locs.—Monterey, *Michener & Bioletti*; cliffs at mouth of Bear Valley, Marin Co., *Davy* 4319; Pt. Reyes, *Davy* 6720, 6756.

Refs.—*SAGINA CRASSICAULIS* Wats. Proc. Am. Acad. 18: 191 (1883), type loc. Dillon's Beach, Marin Co., *Congdon*; *Jepson*, Fl. W. Mid. Cal. 169 (1901). *Alsinella crassicaulis* Greene, Fl. Fr. 125 (1891).

4. **ARENARIA** L. SANDWORT.

Low branching annuals, or tufted or matted perennials. Leaves mostly subulate or acerose and pungent, but often linear, lanceolate or ovate. Flowers white, in terminal cymes or heads, rarely solitary and axillary. Sepals 5. Petals 5, entire or nearly so. Stamens 10. Styles 3. Capsule globose or short-oblong, dehiscent into as many entire or 2-cleft valves as there are styles.—Species about 160; around the whole earth save the southern hemisphere of the Old World, but chiefly in cold northern regions. (Latin arena, sand, in which many species grow.)

Capsule valves 2-toothed or 2-cleft.

Leaves linear, lanceolate or ovate (1 or 2 lines broad), not acerose or pungent.

Perennial.

Plants with running rootstocks; leaves linear-lanceolate....1. *A. macrophylla*.

Plants without rootstocks; leaves oblanceolate to linear.....2. *A. saxosa*.

Annual; leaves ovate.....3. *A. serpyllifolia*.

Leaves subulate or like pine needles, mostly pungent; perennial.

Condensed alpine plant.....4. *A. compacta*.

Taller or more loosely branched plants.

Flowering stems simple, the flowers capitate or umbellate.....5. *A. congesta*.

Flowering stems branching.

Stout or compact; Great Basin species.

Rare; foliage glaucous.....6. *A. aculeata*.

More common; not glaucous.....7. *A. macradenia*.

Slender; high Sierra Nevada.....8. *A. capillaris*.

Capsule valves entire.

Lower altitudes, mostly of the foothills.

Swamp plant; perennial.....9. *A. paludicola*.

Dry ground plants; low annuals.

Petals longer than the sepals; common species.

Leaves filiform.....10. *A. douglasii*.

Leaves lanceolate, broad at base.....11. *A. californica*.

Petals shorter than sepals or none; northern border, rare.....12. *A. pusilla*.

High altitudes or alpine; leaves subulate or filiform, rather rigid, mostly pungent; sepals acute or pungent.

Cyme strict, 1 to 4-flowered.....13. *A. propinqua*.

Cyme more or less spreading, several to many-flowered.....14. *A. nuttallii*.

SECTION 1. **Moehringia**.—Seeds with a strophiole; capsule valves 2-cleft.

1. ***A. macrophylla*** Hook. Perennial, with running rootstocks; stems ascending or erect, puberulent, 2 to 4 inches high; leaves in 3 to 5 pairs, lanceolate or linear-lanceolate, acute at each end, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long; peduncles slender, terminal or becoming axillary, 1 to 5-flowered; sepals ovate, acute or acuminate, 1 to 2 lines long, exceeding the petals; capsule ovoid, nearly equaling or a little exceeding the calyx.

Shady slopes in the mountains, often on mossy rocks, 1600 to 4000 feet: Southern California north through the Coast Ranges and Sierra Nevada to Siskiyou Co. North to British Columbia. May.

Locs.—Coast Ranges: Stonewall Mine, Cuimaca Mts., *Parish* 4532; Mt. Hamilton, *Jepson* 4203; Mt. Day, Santa Clara Co., *E. J. Smith*; Grizzly Peak, *Blasdale*; Bell Springs, n. Mendocino, *Davy* 5352; Kneeland Prairie, *Tracy* 2631; Hupa, *Mary Manning*; Shackleford Creek, w. Siskiyou, *Butler*. Sierra Nevada: Plumas Co. (acc. Bot. Cal. 1: 70); Sequoia Mills (now Millwood), *T. Brandegee*; Colony Mill, Sequoia Park, *Jepson* 663.

Refs.—**ARENARIA MACROPHYLLA** Hook. Fl. Bor. Am. 1: 102, t. 37 (1830), type loc. Strait of Juan de Fuca, *Scouler*; *Jepson*, Fl. W. Mid. Cal. 168 (1901).

SECTION 2. **Euarenaria**.—Seeds without a strophiole; capsule valves 2-toothed or -cleft.

2. ***A. saxosa*** Gray. Stems slender, spreading or decumbent at base, arising from a branching root-crown, 5 to 12 inches high; herbage green, glabrous or retrorsely puberulent; leaves oblanceolate to linear, mucronate, 5 to 10 lines long; flowers in a paniculate cyme, more or less leafy bracteate; sepals narrowly ovate, sharply acute, $1\frac{1}{2}$ lines long, the petals almost or quite equaling them.

Southern California east to the Rocky Mts.

Loc.—Santa Ana Cañon, San Bernardino Mts., 8200 ft., *Hall* 7672; only known station in Cal.

Refs.—**ARENARIA SAXOSA** Gray, Pl. Wright. 2: 18 (1853), type loc. New Mexico, *Wright* 865; *Hall*, *Zoe*, 5: 264 (1908).

3. ***A. serpyllifolia*** L. Stems several from the base, retrorsely puberulent, 3 to 9 inches high; leaves ovate, acute, 1 to 2 lines long; flowers loosely cymose-paniculate, on pedicels 2 to 4 lines long; calyx-lobes ovate-lanceolate, hispidulose on back, $1\frac{1}{2}$ lines long, twice as long as the petals; capsule ovate, equaling the calyx.

Naturalized from Europe. Stream beds, Humboldt Co. and north to Washington.

Locs.—Willow Creek, Trinity River, *Tracy* in 1911; Humboldt Co., on Klamath River, *Chandler* in 1901.

Ref.—**ARENARIA SERPYLLIFOLIA** L. Sp. Pl. 423 (1753), type European.

4. ***A. compacta*** Cov. Flowering stems short ($\frac{1}{2}$ to 2 inches high), scantily leafy, glandular-puberulent, rising little above the much-branched crown of a perennial taproot; crown cushion-like, densely leafy, 1 to 2 inches broad; leaves linear, thickish, minutely glandular and minutely denticulate, 1 to 2 lines long; flowers solitary in the axils or terminal, on pubescent pedicels 2 to 3 lines long; sepals $1\frac{1}{2}$ to 2 lines long, shorter than the petals.

High montane, Sierra Nevada from Yosemite Park south, 9000 to 11,600 feet.

Locs.—Mt. Dana, *Jepson* 3313; Big Cottonwood Mdw., near Mt. Whitney (acc. Coville).

Refs.—*ARENARIA COMPACTA* Cov. Proc. Biol. Soc. Wash. 7: 67 (1892), type loc. near Whitney Mdw., Coville 1653; Contrib. U. S. Nat. Herb. 4: 70, pl. 5 (1893).

5. *A. congesta* Nutt. Flowering stems slender, simple, many from the branching or matted crown of a perennial taproot, densely leafy at base, viscid, 4 to 10 inches high; basal leaves setaceous or needle-like, ciliolate-serrate near the base, $\frac{1}{2}$ to $\frac{3}{4}$ or 2 inches long; cauline leaves reduced to distant bracts 2 or 3 lines long; flowers congested in a head or close cluster, sessile or on pedicels 1 to 2 lines long; sepals broadly ovate, acute; petals oblong, 2 lines long, considerably exceeding the sepals.

High Sierra Nevada and North Coast Ranges, 6000 to 10,000 feet. North to Washington, east to Colorado.

Locs.—Coast Ranges: Snow Mt., *Purpus* 1143; South Yollo Bolly, *Jepson*; Trinity Summit, *Mary H. Manning*; Log Lake near Marble Mt., w. Siskiyou, *Butler* 51. Sierra Nevada: Mt. Bidwell, *Mary H. Manning*; Dixie Mts., Lassen Co., *Baker & Nutting*; Lassen Peak, *R. M. Austin*; Gold Lake, *Hall & Babcock* 4509; Little Cottonwood Creek near Mt. Whitney, *Jepson* 924; Mt. Guyot, *Hall & Babcock* 5527; Farewell Gap, *Hall & Babcock* 5348; Little Kern River, *Purpus* 1780.

Var. *suffrutescens* Rob. Root-crown woody; cauline leaves less reduced; heads umbellate with pedicels 2 to 4 lines long.—Sierra Nevada and far North Coast Ranges. Passing into the type and scarcely worth definition.

Locs.—Sand Meadow, Sequoia Park, *Jepson* 4677; Lost Creek, Sawtooth Range, *Jepson* 4997; Sierra Co., *Leemmon*; Red Clover Creek, Plumas Co., *Hall & Babcock* 4447; Milford, Lassen Co., *T. Brandegee*; Log Lake, w. Siskiyou, *Butler* 51; Union Creek, Salmon Mts., *Hall* 8605.

Refs.—*ARENARIA CONGESTA* Nutt.; T. & G. Fl. 1: 178 (1838), type loc. n. Rocky Mts., *Nuttall*. Var. *SUFFRUTESCENS* Rob. Proc. Am. Acad. 29: 295 (1894). *Brewerina suffrutescens* Gray, Proc. Am. Acad. 8: 620 (1873), type spms. from Cisco and Donner, *Bolander*, *Kellogg*. *Arenaria suffrutescens* Heller, Muhl. 6: 96 (1910).

6. *A. aculeata* Wats. Flowering branches erect, 4 to 6 inches high, nearly naked; branches of the root-crown many, short, densely leafy at summit, forming a dense mat, only a few of them giving rise to flowering branches; herbage minutely glandular; foliage very glaucous; leaves subulate, pungent, 4 to 8 lines long; flowers in a rather close mostly few-flowered cyme; sepals ovate, 2 lines long, acute, the petals $1\frac{1}{2}$ times as long.

Mountains of the Great Basin; in California reported only from Inyo Co.

Locs.—Argus Mts., *Purpus* 5375; Tonopah, Nev., *Shockley*; Mt. Rose, Washoe Co., Nev., *P. B. Kennedy*.

Refs.—*ARENARIA ACULEATA* Wats. Bot. King, 40 (1871), type loc. Fremont's Pass, East Humboldt Mts., Nev., *Watson*. *A. congesta* var. *aculeata* Jones, Proc. Cal. Acad. ser. 2, 5: 626 (1895).

7. *A. macradenia* Wats. Flowering stems erect, often swollen at the joints, 8 to 15 inches high, arising from a woody branching crown 1 to 4 inches high and ending above in a loosely branched cymose inflorescence; herbage glabrous, rarely a little viscid; leaves acerose or subulate, obscurely ciliate at base, $\frac{3}{4}$ to $2\frac{1}{2}$ inches long, the cauline little or not at all reduced and the basal rarely dense or congested; pedicels 4 to 14 lines long; sepals ovate, very acute, $2\frac{1}{2}$ to 3 lines long, the petals equaling or commonly 1 or $1\frac{1}{2}$ lines longer than the sepals; filaments of stamens opposite sepals with glands at base.

Mountains bordering the Mohave Desert, north to Inyo Co., south to Santa Rosa Mt., and east to Utah and Arizona, 4000 to 7000 feet.

Locs.—Bishop, *Heller* 8357; Lone Pine, *Jones*; Argus Mts., *Purpus* 5088; Pahute Peak, *Purpus* 5086; Greenhorn Mts., *Hall & Babcock* 5080; Rock Creek, w. Mohave Desert, *Davidson*; Mt. Gleason, *Barber* 248; Swartout Cañon, Mt. San Antonio, *Hall* 1276; n. slope San Bernardino Mts., *Parish* 3734; Coyote Cañon, Santa Rosa Mt., *Hall* 2126.

Refs.—*ARENARIA MACRADENIA* Wats. Proc. Am. Acad. 17: 367 (1882), type loc. Mohave Desert, *Palmer*, *S. B. & W. F. Parish*. *A. congesta* var. *macradenia* Jones, Proc. Cal. Acad. ser. 2, 5: 626 (1895). *A. macradenia* var. *parishorum* Rob. Proc. Am. Acad. 29: 296 (1894),

type loc. Mohave Desert, *S. B. & W. F. Parish*. *A. congesta* var. *parishorum* Rob. in Gray, Syn. Fl. 1': 242 (1897).

8. *A. capillaris* Poir. Flowering stems very slender, bright green and viscid, branching, 2 to 8 inches high, numerous from a matted base of short branches crowning a perennial taproot; leaves chiefly basal, subulate, 4 to 6 lines long, or as much as $1\frac{1}{4}$ inches long, the cauline few, distant, reduced; inflorescence loosely cymose, the flowers on pedicels 2 to 5 lines long; petals elliptic-obovate or oblong, obtuse, exceeding the elliptic acute sepals.

Granite domes and ridges, Sierra Nevada, 6000 to 10,000 feet, south to the San Bernardino Mts. East to Utah, north to British Columbia; Asia.

Locs.—Sierra Co., *Lemmon*; Webber Lake, *Doten & Kennedy*; Summit, Nevada Co., *Jepson*; Fallen Leaf Lake, *M. S. Baker*; Conness Creek; Tuolumne River, *Jepson* 3358; Mt. Lyell, *Jepson* 3330; Clouds Rest, *Chesnut & Drew*; Little Yosemite, *Jepson* 4401; El Capitan summit, *Jepson* 4366; Black Mt., Fresno Co., *Hall & Chandler* 591.

Var. *ursina* Rob. More condensed and regularly branched; leaves 2 to 3 lines long; sepals blunter, nearly as long as the petals.—Bear Valley, San Bernardino Mts.

Refs.—*ARENARIA CAPILLARIS* Poir, in Lam. Encycl. 6: 380 (1804), type Siberian. Var. *URSINA* Rob. in Gray, Syn. Fl. 1': 240 (1897). *A. ursina* Rob. Proc. Am. Acad. 29: 294 (1894), type loc. Bear Valley, San Bernardino Mts., *S. B. & W. F. Parish*.

SECTION 3. *Alsine*.—Seeds without a strophiole; capsule valves entire.

9. *A. paludicola* Rob. Glabrous flaccid perennial, the stems procumbent, rooting at the lower joints, sulcate, shining, leafy throughout, 1 to $2\frac{1}{2}$ feet long or when growing amongst tules or other plants to 5 feet long; branches few, very long; leaves linear or linear-lanceolate, thickish, acute, $\frac{3}{4}$ to $2\frac{1}{4}$ inches long, slightly connate at base; peduncles solitary in the axils, 1 to 2 inches long, spreading or somewhat deflexed; sepals elliptic, nerveless, herbaceous, $1\frac{1}{2}$ to 2 lines long, about half the length of the obovate petals; capsule oblong, shorter than the calyx.

Swamps, Southern California to Washington. Rarely collected. The angled stems are very noteworthy.

Locs.—Santa Ana River near San Bernardino, *Parish*; near Los Angeles (Davidson, Pl. L. A. Co. 4); formerly at Fort Point, San Francisco.

Refs.—*ARENARIA PALUDICOLA* Rob. Proc. Am. Acad. 29: 298 (1894). *A. palustris* Wats. Bot. Cal. 1: 70 (1876), not Naud. *Alsine palustris* Kellogg, Proc. Cal. Acad. 3: 61 (1863), type loc. San Francisco, *Bolander*. *Alsineopsis palustris* Heller, Muhl. 8: 96 (1912).

10. *A. douglasii* Fenzl. Annual, nearly glabrous, sometimes minutely glandular-pilose; stems much branched, 2 to 8 inches high, developing a loosely cymose inflorescence; leaves filiform, 3 to 5 lines long or the lowermost longer; pedicels filiform, 3 or mostly 7 to 13 lines long; flowers numerous; sepals oblong-ovate, narrowly thin-margined, 1 to $1\frac{1}{2}$ lines long; petals obovate or roundish, conspicuous, $\frac{1}{2}$ again as long as the sepals; filaments of those stamens alternate with the petals bearing a yellow bidentate gland on the under side at base; capsule sub-globose; valves rounded at the apex; seeds large, smooth, compressed-reniform, acutely margined.

Sterile soil of hillsides or mesas, 100 to 4000 feet: Coast Ranges and Sierra Nevada; Southern California. Apr.-May.

Locs.—Sierra Nevada: North Tule River, *Purpus* 5683; Kaweah River, *Hopping*; Kinsley, Mariposa Co., *Charlotte M. Hoak*; Jackson, *Hansen*; College City, Colusa Co., *Alice King*; Stillwater, Shasta Co., *M. S. Baker*; Yreka, *Butler* 660. Coast Ranges: Tehama Co., *Jepson*; Hyampum, *Blasdale*; Harris, Humboldt Co., *Ethel Tracy*; Round Valley, *Westerman*; Blue Rock Ridge, Mendocino Co., *Jepson* 1877; Healdsburg, *Alice King*; Mt. George, Napa Range, *Jepson*; Pine Peak, Vaca Mts., *Jepson*; Burlingame, *C. E. Durrell*; Livermore Valley, *Jepson*; San Miguelito Rancho, Santa Lucia Mts., *Jepson* 1644; San Bernardino Valley, often whitening

wide areas on the sandy mesas, *Parish*; Chalk Hill, Mt. San Jacinto, *Jepson*; Coahuilla Valley to Aguanga, *Jepson* 1477; Julian, San Diego Co., *T. Brandegee*.

Refs.—*ARENARIA DOUGLASHII* Fenzl; T. & G. Fl. 1: 674 (1840), type from California, *Douglas*; *Jepson*, Fl. W. Mid. Cal. 168 (1901). *Alsinospis douglasii* Heller, Muhl. 8: 20 (1912).

A. HOWELLII Wats. Proc. Am. Acad. 20: 354 (1885), type loc. Waldo, Ore., *Howell*. Annual; stems erect, very slender, branching freely from the base, $\frac{3}{4}$ to $1\frac{1}{2}$ feet high; herbage purplish, the leaves, nodes and sepals sparingly glandular-pubescent, otherwise mainly glabrous; leaves crowded at base of stem, scattered and reduced above, lanceolate, thickish, acutish, sessile by a broad base, becoming rigid in age, 3 to 5 lines long; petals ovate, attenuate, much exceeding the abruptly acute sepals; capsule valves narrowed to an acutish apex; seeds 2, somewhat flattened, minutely papillate or tuberculate-crested on the margin. —*Josephine Co.*, Oregon, on Shelley Creek-Waldo road near California boundary, *Jepson* 2922. The plant in its early flowering stage is very similar to *A. douglasii*; as it ages the stems become more rigid and more purple, and its aspect is greatly changed.

11. *A. californica* Brewer. Stems delicate and filiform, diffusely branching from the base, 1 to 4 inches high, the flowers loosely cymose on pedicels 3 to 8 lines long; herbage glabrous; leaves lanceolate, obtuse, very short, slightly fleshy, 1 to 2 lines long; sepals oblong-ovate, $1\frac{1}{2}$ lines long, the petals oblong, $1\frac{1}{2}$ times as long; seeds small, finely roughened.

Gravelly hillslopes or disintegrating rock outcroppings in the Coast Ranges from Mt. Hamilton to Mendocino Co. and northward; and in the Sierra Nevada from El Dorado Co. north to Butte Co.; 100 to 2000 feet. Southern Oregon. Apr.-May.

Locs.—Coast Ranges: Lake Merced, San Francisco, *Tracy* 1815; Berkeley Hills, *Tracy* 1798; St. Helena, *Clara Hunt*; Kelseyville, *Irwin*; Scotts Valley, Lake Co., *Tracy* 1658; Long Valley, Mendocino Co., *Bolander* 4684; Crane Creek, Tehama Co., *Jepson*. Sierra Nevada: Rose Sprs., El Dorado Co., *M. H. Gates*; Auburn, *Bolander* 4543; Marysville Buttes, *Jepson*; Rough & Ready, Nevada Co., *Jepson*; plains east of Chico, *R. M. Austin*.

Refs.—*ARENARIA CALIFORNICA* Brewer, Bot. Cal. 1: 69 (1876); *Bolander*, Cat. Pl. S. F. 6 (1870) as a nomen nudum; *Jepson*, Fl. W. Mid. Cal. 168 (1901). *A. brevifolia* var. ? *californica* Gray, Proc. Cal. Acad. 3: 101 (1864), based on Californian spms. by *Fremont* (no. 284) and *Brewer* (from Sonoma). *Alsinospis californica* Heller, Muhl. 8: 10 (1912).

12. *A. pusilla* Wats. Stems simple or several from the base, capillary, 1 to 2 inches high; leaves lanceolate, 1 to 2 lines long; sepals ovate-lanceolate, acute, 1 line long; petals lanceolate or narrowly ovate, nearly transparent, shorter than the sepals, or more minute, or none; stamens 3, rarely 4 or 5; capsule scarcely equaling the calyx; seeds smooth.

Dry pine woods, northern border of California and north to Washington. Appears like a reduced form of *A. californica*.

Locs.—Quartz Valley, Siskiyou Co., *Butler* 619 (petals sprinkled on the upper side with small roughish dots); *Tracy* 3130, on sand-dunes at Humboldt Bay, appears to be the same.

Refs.—*ARENARIA PUSILLA* Wats. Proc. Am. Acad. 17: 367 (1882), type loc. Yreka, *Greene*. *Alsinospis pusilla* Heller, Muhl. 8: 96 (1912).

13. *A. propinqua* Rich. Tufted, 1 to 3 inches high, with numerous filiform stems mostly leafy at base and ending above in a rather strict 1 to 4-flowered cluster; herbage glandular-puberulent; leaves linear-subulate, $1\frac{1}{2}$ to $2\frac{1}{2}$ lines long; flowers small; sepals ovate to ovate-lanceolate, acute, 1 to $1\frac{1}{2}$ lines long, strongly 3-nerved on the back, larger than the petals.

Siskiyou Co., 8000 feet. Arizona to Oregon and far northward.

Locs.—Marble Mt., *Chandler* 1673. The plant of the San Bernardino Mts. referred to *A. verna* var. *hirta* in Syn. Fl. 1': 246 belongs to the next species.

Refs.—*ARENARIA PROPINQUA* Rich.; Franklin, Jour. 738 (1823), type from boreal N. Am. *Alsinoopsis propinqua* Rydb. Bull. Torr. Club, 33: 140 (1906). *Arenaria verna* L. var. *hirta*, Wats. Bot. King, 41 (1871).

14. *A. nuttallii* Pax. Stems prostrate or ascending, many from the crown of a perennial taproot, more or less matted, giving rise to erect flowering branches which are commonly densely leafy at base; herbage glandular-puberulent; leaves subulate, rigid, pungent, 3 to 5 lines long; flowers rather loosely and divergently cymose, on pedicels 3 to 6 lines long; sepals lanceolate, or oblong-lanceolate, very acute, 2 to $2\frac{1}{2}$ lines long, equaling or exceeding the petals.

Northern borders of California: Lassen Peak and Mt. Eddy. North to Oregon and Montana.

Var. *gracilis* Rob. Plant more compact and regular; sepals lanceolate-subulate, acuminate or shortly awn-tipped, $2\frac{1}{2}$ to 3 lines long, the midnerve on the back very strong; petals oval or oblong-ovate, acute or acuminate, much shorter than the sepals.—Decomposed granite, 9000 to 12,000 feet: Sierra Nevada from Yosemite Park south to Farewell Gap; San Bernardino and San Gabriel mountains. Passing into the typical form.

Locs.—Sierra Nevada: Rock Creek, Mt. Whitney, *Jepson* 5060; Siberian Pass, Tulare Co., *Hall & Babcock* 5479; Little Kern River, *Purpus* 5253; Mineral King, *T. Brandegee*; Kaweah Peak, *Jepson* 4999; Alta Mtns., *G. B. Grant* 5318; Mt. Silliman, *Jepson* 753; Mt. Goddard, *Hall & Chaudler* 620; mountains above Mariposa Big Trees, *Bolander* 4976; Sonora Pass, *Brewer* 1879. Southern California: Mt. San Geronimo (Grayback), *W. G. Wright*; Mt. San Antonio, *McClatchie* 182.

Var. *gregaria* *Jepson* n. comb. Flowering stems numerous, 3 to 5 inches high, ending above in a cymose panicle, leafy-inbricated at base and borne on ascending or creeping stems arising from the crown of a taproot; herbage purplish or green, clammy or softly viscid-pubescent; leaves subulate, 3 to 5 lines long, blunt; flowers more or less clustered in a many-flowered panicle, 1 to $2\frac{1}{2}$ inches high, the pedicels $\frac{1}{2}$ to 2 (or 3) lines long; sepals often purplish, oblong-ovate or lanceolate, shortly acute or acuminate, 2 to $2\frac{1}{2}$ lines long, commonly exceeded by the oblong-lanceolate or narrowly obovate petals.—Rocky ridges, high North Coast Ranges, 4000 to 7000 feet. July. This is so unlike var. *gracilis* that the two have the quality of distinct species. But southern forms of var. *gracilis* pass into the species, and, as there are forms intermediate between var. *gregaria* and the species, these two varieties are thus connected in a continuous series.

Locs.—Snow Mt., *T. Brandegee*; Mt. Hull, *Hall* 9530; South Yollo Bolly, *Jepson*; Lasseek Peak, *Goddard* 658; Devils Backbone, s. w. Siskiyou, *Jepson* 2065; near Preston Peak, w. Siskiyou, *Jepson* 2871; Goosenest foothills, *Butler* 1638. *Hall* 8578, Salmon Mts., connects this variety with the species.

Refs.—*ARENARIA NUTTALLII* Pax in Engler, Bot. Jahrb. 18: 30 (1894). *A. pungens* Nutt. (not Clem.); T. & G. Fl. 1: 179 (1838), type loc. n. Rocky Mts., *Nuttall*. Var. *GRACILIS* Rob. Proc. Am. Acad. 29: 304 (1894), type spms. from mt. above Mariposa Grove, *Bolander*, and from Tulare Co., *Palmer, Coville & Funston*. Var. *GREGARIA* *Jepson*. *A. gregaria* Heller, Bull. S. Cal. Acad. 2: 67 (1903), type loc. Mt. Sanhedrin, *Heller* 5892. *Alsinoopsis gregaria* Heller, Muhl. 8: 96 (1912).

5. SPERGULARIA J. & C. Presl. SAND SPURREY.

Low herbs, usually of alkaline plains, borders of salt marshes, or maritime. Leaves linear or subulate-filiform, semi-terete, with scarious stipules. Flowers cymose or racemose, the pedicels at length spreading or deflexed. Sepals 5. Petals 5, purplish or white, entire. Stamens commonly 10. Style 3, rarely 5. Capsule 3-valved. Seeds often wing-margined. Embryo annular.—Species about 15, widely distributed on seashores and in saline localities all over the earth. (Derivative of *Spergula*.)

Perennials.

Erect or ascending, more or less succulent, with fusiform fleshy roots; saline or seacoast habitats.....1. *S. macrotheca*.

Prostrate, not obviously succulent; roots fibrous, not fleshy-fusiform.

Stems long and somewhat straggling, from a matted or tufted center, flowering from the middle to the ends of the branches.....2. *S. rubra*.

Plants matted; flowering mostly at the ends of the branches.....3. *S. clelandii*.

Annuals, quite erect or ascending.

Herbage more or less pubescent; saline habitats.

Capsules slightly longer than the sepals; petals 5, nearly equaling the sepals.....4. *S. salina*.

Capsules nearly twice as long as the sepals; petals 3 to 5, $1\frac{1}{2}$ to $\frac{3}{4}$ as long as the sepals.....5. *S. tenuis*.

Herbage glabrous; flowers $\frac{1}{2}$ to 1 line long; dried ponds.....6. *S. platensis*.

1. ***S. macrotheca*** Heynh. Stems stout, 7 to 12 inches high, erect or ascending from the short, often branched, woody crown of a very thick and fleshy taproot; herbage deep green and viscid-pubescent throughout, rarely subglabrous; leaves narrowly linear, 1 to $1\frac{1}{2}$ inches long; flowers in terminal cymes, their branches often racemose; pedicels 2 to 7 lines long; sepals 3 to 4 lines long, scarious-margined; petals as long, pink; capsule equaling or a little exceeding the calyx; seeds with or without a wing, even in the same capsule.

Sandy borders of salt marshes, coast region of California.

Locs.—Humboldt Pay, *Tracy* 3093; Pt. Reyes, *Davy* 6773; Benicia, *Jepson*; Pt. Isabel, *Blasdale*; West Berkeley, *Jepson*; Alameda, *Jepson*; Morro, San Luis Obispo Co., *Barber*; Oceanside, San Diego Co., *Parish* 4451.

Var. ***leucantha*** Rob. Glabrous, especially below, or more lightly pubescent; inflorescence looser; flowers commonly white.—Alkaline plains of the interior valleys: Sacramento, San Joaquin and Livermore valleys; south to Southern California. May-June.

Locs.—Willows, *Jepson*; Lathrop, *Greene*; Livermore, *Michener & Bioletti*; Bakersfield, *Davy* 1856; Antelope Valley, *Davy* 2256; San Bernardino, *Parish* 4464; San Jacinto, *Jepson* 1244.

Var. ***scariosa*** Rob. Herbage pale, glandular-pubescent or almost glabrous; stipules ovate, acuminate, 4 to 5 lines long, conspicuously silvery-scarious; flowers scattered and on pedicels 3 to 7 lines long or less, or in reduced terminal cymes.—Sea-bluffs, San Francisco to Monterey.

Locs.—Pt. Richmond, *Hall*; San Francisco, *Greene*; Montara Pt., San Mateo Co., *Copeland*; Pacific Grove, *Tidestrom*.

Var. ***talinum*** *Jepson* n. comb. Slightly woody at base; internodes very short (2 to 5 lines mostly), the stems densely clothed with leaves; herbage heavily glandular-pubescent or nearly glabrous; cyme shortly peduncled.—San Clemente Island, *T. Brandegee*.

Refs.—SPERGULARIA MACROTHECA Heynh.; Rob. in Gray, Syn. Fl. 1': 252 (1897). *Arenaria macrotheca* Hornem. in C. & S. Linnaea, 1: 53 (1826), type from California. *Lepigonum medium* of some Californian distributions. Var. LEUCANTHA Rob. Proc. Am. Acad. 29: 313 (1894). *Tissa leucantha* Greene, Pitt. 1: 301 (1889), type loc. western side of the lower San Joaquin and adjacent Livermore Valley. Var. SCARIOSA Rob. l. c. *Tissa macrotheca* var. *scariosa* Britt. Bull. Torr. Club, 16: 129 (1889), type spms. from San Francisco and Monterey. *Tissa pallida* Greene, in Britt. l. c., type loc. San Francisco, *Greene*. *Tissa valida* Greene, Erythra, 1: 107 (1893), type loc. Santa Cruz Isl., *Greene*. Var. TALINUM *Jepson*. *Tissa talinum* Greene, Erythra, 1: 106 (1893), type loc. Guadalupe Island, Lower California.

2. ***S. rubra*** J. & C. Presl, var. ***perennans*** Rob. Stems prostrate, 4 to 9 inches long, slender and wiry, many from a densely tufted base, branching little, flowering from about the middle; herbage comparatively glabrous; leaves narrowly linear, $1\frac{1}{2}$ to 5 lines long; stipules ovate, silvery-scarious, 2 lines long, very conspicuous; pedicels slender, 2 to 3 (or 5) lines long; sepals

oblong, acute, $1\frac{1}{2}$ to 2 lines long; petals red or reddish, about equaling the sepals; capsule not exceeding the calyx; seeds with a marginal elevation.

Beaten paths and by roadsides. Northern California. May. Introduced from Europe, spreading slowly, but gradually becoming more common.

Locs.—Eureka, *Tracy* 2497; Shasta Springs, *Jepson*; Redding, *Baker & Nutting*; Bear Valley, Nevada Co., *Jepson*; Denverton, *Jepson*; upper Napa Valley, *Jepson*; Mt. Eden, *K. Brandegee*.

Refs.—SPERGULARIA RUBRA J. & C. Presl, Fl. Cech. 94 (1819). *Arenaria rubra* L. Sp. Pl. 423 (1753), type European. Var. PERENNANS Rob. in Gray, Syn. Fl. 1': 250 (1897). *Tissa rubra* var. *perennans* Greene, Pitt. 2: 229 (1892). *Lepigonum rubrum* var. *perennans* Kindb. Monog. 41 (1863), type from Sweden.

3. **S. clevelandii** Rob. Perennial, the prostrate stems forming deep green mats 5 to 13 inches broad; herbage viscid-glandular; leaves filiform, conspicuously fasciated in the axils, ascending, 6 to 9 lines long, all longer than the internodes; flowers in terminal cymes; sepals oblong, acute, 2 lines long; corolla white, about equaling the calyx; seeds winged or not winged, even in the same pod.

Sandy soil near the ocean: San Diego and San Francisco eos.

Locs.—San Francisco, *Jepson*; Chula Vista, *Geo. B. Grant* 1238; San Diego, *T. Brandegee*; National City, *Abrams* 3525.

Refs.—SPERGULARIA CLEVELANDII Rob. Proc. Am. Acad. 29: 310 (1894). *Tissa clevelandii* Greene, Fl. Fr. 127 (1891), type loc. San Diego, *Cleveland*. *T. villosa* Britt. Bull. Torr. Club, 16: 129 (1889). *T. rubra* K. Brandegee, Zoe, 4: 84 (1893).

4. **S. salina** J. & C. Presl. Stems branching, erect, or sometimes diffuse and prostrate, 3 to 8 inches long; herbage somewhat fleshy, nearly glabrous or lightly pubescent; leaves narrowly linear, $\frac{3}{4}$ to $1\frac{1}{3}$ inches long, commonly shorter than the internodes; flowers in terminal cymes, the branches often racemose; pedicels leafy-bracted or the upper bractless, not exceeding the capsules; sepals oblong-ovate, obtusish, scarious-margined, 2 lines long, the petals nearly as long; capsule slightly longer than the calyx.

Alkaline plains of the Sacramento and San Joaquin, westward to the salt marshes near the coast, and south to Southern California. North Atlantic Coast. Europe. May-Aug.

Locs.—Calistoga, *Tracy* 1858; Denverton, *Jepson*; Stockton, *Sanford*; Walnut Creek, *Jepson*; San Felipe, Santa Clara Co., *Jepson*; West Berkeley, *Tidestrom*; Alameda, *Jepson*; Los Angeles, *Geo. B. Grant* 4583; West Riverside, *F. M. Reed*.

Var. **sordida** *Jepson* n. comb. Leaves dark with a heavy glandular indument; branches of the cymes secund, rather dense.—Marshes about San Francisco Bay (Alameda, *Searsville*).

Refs.—SPERGULARIA SALINA J. & C. Presl, Fl. Cech. 95 (1819), type European; *Jepson*, Fl. W. Mid. Cal. ed. 2, 156 (1911). *Tissa marina* Britt. Bull. Torr. Club, 16: 126 (1889), not *Tissa salina* Britt. *T. salina* var. *sanfordi* Greene, Fl. Fr. 129 (1891), type loc. lower San Joaquin. Var. **SORDIDA** *Jepson*. *Tissa salina* var. *sordida* Greene, l. c., type loc. Bay Farm Island.

5. **S. tenuis** Rob. Annual; stems dichotomously and copiously branched from the base, erect or diffuse, 3 to 5 inches high, the branches slender and internodes long; herbage scarcely fleshy, lightly viscid-puberulent; leaves linear-filiform, 4 to 7 lines long, shorter than the internodes; flowers $\frac{3}{4}$ to 1 line long, in terminal cymes, numerous, short-pedicelled, the uppermost sessile in close clusters; sepals oblong-ovate; stamens 2 to 5; capsule twice as long as the fruiting sepals or nearly.

Saline plains, Sacramento Valley southward to Southern California.

Locs.—Willows, *Jepson*; Newark, *Davy* 1113; San Felipe, Santa Clara Co., *Jepson*; Delano, Kern Co., *Davy* 2438; (?) Barstow, *Jepson* 4797; Santa Monica (acc. *Abrams*, Fl. Los Ang. 149).

Refs.—*SPERGULARIA TENUIS* Rob. Proc. Am. Acad. 29: 311 (1894). *Lepigonum tenue* Greene, Pitt. 1: 63 (1887), type loc. Alameda salt marshes, Greene, May, 1887. *Tissa tenuis* Greene in Britt. Bull. Torr. Club, 16: 128 (1889). *T. salina* var. *tenuis* Jepson, Fl. W. Mid. Cal. 170 (1901). *Spergularia salina* var. *tenuis* Jepson, l. c. ed. 2, 156 (1911).

As this seems to pass into *S. salina* we have hitherto held it as a variety of that species. While it has a somewhat distinctive habit it is still too little known and is here reluctantly given specific rank. The var. *involuta* Rob. in Gray, Syn. Fl. 1: 251 (1897), type loc. Mt. Eden, K. Brandegee, is a form with the flowers in somewhat capitate clusters subtended by long foliaceous bracts.

6. ***S. platensis*** Fenzl. Annual; stems numerous, nearly filiform, branching, $1\frac{1}{2}$ to $3\frac{1}{2}$ inches high; herbage glabrous; leaves linear-filiform, 3 to 8 lines long, mostly shorter than the internodes; upper leaves much reduced, not exceeding the scarious stipules; flowers in terminal cymes, the branches somewhat racemose; pedicels 1 to 2 lines long; flowers $\frac{1}{2}$ to 1 line long; petals 1 to 3 and minute, or lacking; capsule somewhat exceeding the sepals.

Dried ponds, Southern California. East to Texas. Brazil.

Locs.—Between Rivera and Florence on the adobe mesa, Abrams 3252; Carrizo Creek, T. Brandegee.

Refs.—*SPERGULARIA PLATENSIS* Fenzl, Ann. Wien. Mus. 2: 272 (1839). *Balardia platensis* Cambess. in St. Hil. Fl. Bras. Merid. 2: 180, t. 111 (1829), type loc. s. Brazil. *Lepigonum gracile* Wats. Proc. Am. Acad. 17: 367 (1882), type spms. from Dallas, Tex., J. Reverchon, and Wilmington and Compton, Cal., Nevin. *Tissa gracilis* Britt. Bull. Torr. Club, 16: 128 (1889).

6. **SPERGULA** L. SPURREY.

Annual. Leaves narrowly linear or subterete, apparently in whorls, but really opposite, several others of their own size being crowded in the axils; stipules small and scarious. Flowers symmetrical. Sepals 5. Petals 5, white, entire. Stamens 10, occasionally 5. Styles 5, alternate with the sepals. Capsule 5-valved, the valves entire, opposite the sepals. Embryo spirally annular.—Species 2 or 3, in both hemispheres. (Latin spargere, to scatter, in reference to the dispersion of the seeds.)

1. ***S. arvensis*** L. CORN SPURREY. Diffusely branching from the base, the stems 1 to 2 feet long; pubescence of short spreading glandular hairs; leaves slightly fleshy, $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, numerous in rather remote whorls; flowers white, 4 lines broad, in a cymose panicle with strongly divergent branches turned abruptly downward after flowering; petals ovate, exceeding the sepals.

Fields and orchards near the coast, rarely in the interior. Apr. Introduced European weed. Readily eaten by cattle and said to increase the flow of milk. Flowers opening only of afternoon.

Locs.—San Diego, T. Brandegee in 1901; Pasadena (Erythea, 1: 102); Monterey, Jepson 2996 in 1908; Berkeley, Jepson in 1886; Mt. Diablo, Brewer in 1862; Olema, Jepson 4038 in 1910; Eureka, Tracy 2983 in 1909; Ione, Braunton in 1904.

Refs.—*SPERGULA ARVENSIS* L. Sp. Pl. 440 (1753), type European; Jepson, Fl. W. Mid. Cal. 170 (1901).

7. **POLYCARPON** L.

Low much-branched annuals with numerous flat leaves, small scarious stipules and very small flowers in cymes. Sepals 5, more or less carinate, scarious-margined. Petals 5, hyaline, shorter than the sepals. Stamens 3 to 5. Style 1, very short, 3-cleft or the stigma 3-lobed. Capsule 3-valved. Seeds several. Embryo little curved.—Species about 6, temperate and tropic regions. (Greek polus, many, and karpós, fruit, in reference to the numerous pods.)

Leaves in 4s or opposite; inflorescence leafless.....1. *P. tetraphyllum*.
Leaves opposite; inflorescence more or less leafy.....2. *P. depressum*.

1. ***P. tetraphyllum*** L. Stems diffuse or prostrate, 2 to 5 inches long; herbage glabrous or nearly so; leaves in 4s or opposite, oblong or obovate, short-

petioled, 2 to 6 lines long; cyme leafless, many-flowered, dense, the flowers 1 line long, short pediceled; sepals green or purplish, strongly keeled, apiculate-hooded; style slender, $\frac{2}{3}$ as long as the ovary; stigma 3-lobed; capsule nearly equaling the calyx.

Beaten gravelly places. Naturalized from Europe. July-Aug.

Loes.—Vallejo, *Michener & Bioletti* in 1892; St. Helena, *Jepson* in 1897; Berkeley, *Tracy* in 1903.

Refs.—POLYCARPON TETRAPHYLLUM L. Syst. Nat. ed. 10, 881 (1759); Jepson, Fl. W. Mid. Cal. 171 (1901). *Mollugo tetraphylla* L. Sp. Pl. 89 (1753), type European.

2. **P. depressum** Nutt. Plants prostrate, 1 to 3 inches broad with slender stems; leaves spatulate, varying to obovate, obtuse or acute, $\frac{1}{2}$ to 2 lines long; flowers $\frac{1}{2}$ as large as in the preceding; sepals not keeled or scarcely so, about $\frac{1}{2}$ line long; petals white, membranous, linear, $\frac{1}{2}$ as long as the sepals; style very short, 3-cleft.

Southern California, from the coast east to the base of the San Bernardino Mts.; Monterey Co.

Loes.—Pajaro Hills, *Chandler* 426; San Bernardino, *Parish* 3643; Claremont, Los Angeles Co., *C. F. Baker*; Avalon, *F. M. Reed* in 1909; San Diego, *T. Brandegee*.

Refs.—POLYCARPON DEPRESSUM Nutt.; T. & G. Fl. 1: 174 (1838), type loc. San Diego, *Nuttall*; Jepson, Fl. W. Mid. Cal. 171 (1901).

8. LOEFLINGIA L.

Low rigid annuals, dichotomously branched from the base, with subulate leaves and setaceous stipules. Flowers small, sessile in the axils. Sepals acuminate or awn-tipped, the outer with a tooth on each side. Petals 3 to 5, minute or none. Stamens 3 to 5. Style 1, very short or none; stigmas 3. Capsule 3-valved, several-seeded.—Species 5, North America, Mediterranean region, Asia. (Peter Loeffling, Swedish traveler of the 18th century.)

Sepals recurved; style very short but present.....1. *L. squarrosa*.
Sepals straight; style none.....2. *L. pusilla*.

1. **L. squarrosa** Nutt. Stems diffusely branched from base, 2 to 5 inches high; herbage glandular-pubescent; leaves cuspidate, squarrose-spreading, 2 to 3 lines long; petals very minute; sepals rather strongly recurved and squarrose; capsule shorter than the sepals.

San Diego north to the Sacramento and San Joaquin valleys; Sierra Co. (acc. Syn. Fl. 1^a: 255).

Loes.—San Diego, *T. Brandegee*; Pasadena, *Grant*; San Bernardino, *Parish* 7104; Oakdale, *Jepson*.

Refs.—LOEFLINGIA SQUARROSA Nutt.; T. & G. Fl. N. Am. 1: 174 (1838), type loc. San Diego, *Nuttall*; Jepson, Fl. W. Mid. Cal. 171 (1901).

2. **L. pusilla** Curran. Much like the preceding but more delicate; stems spreading, 2 to 3 inches long; sepals narrowly lanceolate, abruptly acute, entire, neither rigid nor squarrose; petals none; stamens 3; capsule as long as the sepals.

Tehachapi, 4000 feet.

Ref.—LOEFLINGIA PUSILLA Curran, Bull. Cal. Acad. 1: 152 (1885), type loc. Tehachapi, *Mary K. Curran*.

9. HERNIARIA L.

Ours a very small annual, with minute scarious stipules. Flowers minute, green, in clusters, crowded, sessile. Sepals 5 or 4, united at base. Petals setaceous and minute, or none. Stamens 2 to 5, inserted on the calyx base. Style very short, 2-cleft or -parted. Fruit a 1-seeded indehiscent achene, with a thin pericarp, enclosed in the calyx.—Species about 20, Europe, Asia, Africa. (Latin hernia, a rupture, which one species was thought to cure.)

1. **H. cinerea** DC. Tiny erect plants, 1 to 2½ inches high, or sometimes forming prostrate mats 3 to 14 inches broad, the branches bearing 2-ranked branchlets; herbage hispidulous; leaves oblong-oblancoolate, 1½ to 2½ lines long; flowers in all the axils, even the lowest; calyx ½ line long, very hispid.

San Joaquin region at the edge of the foothills on either side of the valley. Naturalized from southern Europe. May-June.

Locs.—Wawona, *Congdon* in 1897; Oakdale, *Jepson* in 1896; Escalon, *Eastwood* in 1905; Stockton and Tracy, *K. Brandegee* in 1907.

Refs.—**HERNIARIA CINEREA** DC. Fl. Fr. Suppl. 375 (1815), type European; *Jepson*, Fl. W. Mid. Cal. 172 (1901). *Paronychia pusilla* Greene, Pitt. 1: 302 (1889), type loc. Bethany, San Joaquin Co., *Greene*.

10. **PENTACAENA** Bartl.

Tufted perennials with subulate pungent leaves and silvery-hyaline stipules. Flowers sessile, clustered in the axils. Sepals 5, almost distinct, very unequal, hooded, the 3 outer larger, and with a stout divergent terminal spine, the 2 inner smaller and with a shorter spine. Petals minute, scale-like. Stamens 3 to 5, inserted at the base of the sepals. Style very short, bifid. Utricle enclosed in the rigid persistent calyx.—Species 5. Pacific North America and andine South America. (Greek pente, five, and akaina, a thorn, the five sepals spine-tipped.)

1. **P. ramosissima** H. & A. SAND MAT. Stems prostrate, forming dense mats 5 to 18 inches broad, pubescent; leaves crowded on the stems, 2 to 4 lines long, the stipules ½ or sometimes nearly as long; calyx 1½ to 2 lines long; sepals hairy or woolly below the divergent spinose apex; utricle apiculate.

On sand-dunes or in sandy soil along the entire California coast. In Southern California extending inland 25 miles. North to Washington, south to Mexico. Chile. Apr.-May.

Locs.—San Diego, *G. W. Dunn*; Delmar, *Jepson* 1614; Pala and Poway, acc. *Parish*; Ocean-side, *Parish* 4439; Santa Rosa Island, *P. M. Jones*; Santa Cruz Island, *T. Brandegee*; Arroyo Grande, *Alice King*; Pacific Grove, *Jepson*; San Francisco, *C. F. Baker* 2998; Humboldt Bay, *Tracy* 3018.

Refs.—**PENTACAENA RAMOSISSIMA** H. & A. in Hook. Bot. Misc. 3: 338 (1833), type from Chile; *Jepson*, Fl. W. Mid. Cal. 172 (1901). *P. polyenemoides* Bartl. in Presl, Rel. Haenk. 2: 5, t. 49, fig. 1 (1835).

11. **PARONYCHIA** L. WHITLOW-WORT.

Prostrate tufted perennial, with scarious stipules and clustered axillary flowers. Sepals 5, almost distinct, equal, linear or oblong, concave or cucullate under the apex, the very tip furnished with a short bristle or cusp. Petals filament-like, or minute teeth, or none. Stamens 5, inserted on the base of the sepals. Ovary 1-ovuled. Style deeply 2-parted. Fruit a utricle enclosed in the persistent calyx, at length bursting longitudinally.—Species 40, all continents except Australia. (Greek paronuchia, a whitlow or felon, the name applied to an herb used as a remedy.)

1. **P. franciscana** Eastw. Stems 4 to 12 inches long, tough, the internodes very short (only 1 to 2 lines long at base); leaves oblanceolate, acute, cuspidate. 2 to 4 lines long, much crowded on the branches and branchlets, especially towards the ends; stipules hyaline; flowers 1 line long, obviously pediceled, 3 or 4 in the axils.

Grassy hilltops, San Francisco and Bodega Port. Introduced from Chile where it is native. Apr.-June.

Refs.—**PARONYCHIA FRANCISCANA** Eastw. Bull. Torr. Club, 28: 288 (1901), type spms. from San Francisco and Bodega Port. *P. chilensis* Greene, West Am. Sci. 3: 156 (1887) and Fl. Fr. 131 (1891), not DC; *Jepson*, Fl. W. Mid. Cal. 172 (1901).

12. **ACHYRONYCHIA** T. & G.

Glabrous plants with spatulate leaves and large hyaline stipules. Leaves

of the opposite pairs unequal. Flowers bright silvery-white by reason of the scarious calyx-lobes, borne in dense axillary cymose clusters. Calyx-lobes 5. Petals none. Stamens 10 to 15, only 1 to 5 anther-bearing. Style bifid, in-



Fig. 98. *ACHYRONYCHIA COOPERI* T. & G.; entire plant, $\times \frac{2}{3}$.

cluded. Utricle thin, included in the calyx.—Species 2, California and Mexico. (Greek achuron, chaff, and onyx, onychos, a finger nail, in reference to the thin shining calyx-lobes.)

1. *A. cooperi* T. & G. (Figs. 98 and 99a.) Stems 2 to 5 inches long, slender, prostrate, radiating from the crown of an annual root; leaves spatulate, $1\frac{1}{2}$ to 9 lines long; flowers 1 line long, in conspicuous dense axillary cymes; calyx-lobes scarious, their lower third fleshy-herbaceous like the urn-shaped calyx-tube.

Sandy washes and valleys, Mohave and Colorado deserts. Lower California. May.

Loes.—Needles, *Jones* 3790; Salt Well, Mohave Desert, *Hall & Chandler* 6891; Carrizo Creek, *T. Brandegee*; Conchilla Desert, *Jepson* 6053; Indian Well, *Hall* 5773; Split Mt., *Parish* 9051.

Ref.—*ACHYRONYCHIA COOPERI* T. & G. *Proc. Am. Acad.* 7: 331 (1868), type loc. Camp Cady (near Daggett), *Cooper*.



Fig. 99. *a*, *ACHYRONYCHIA COOPERI* T. & G., flower laid open. *b*, *EREMOLITHIA RIXFORDII* Jepson; flower laid open. $\times 7$.

13. *EREMOLITHIA* Jepson nov. gen.

Perennial with erect stems and linear leaves. Stems arising from a woody root crown crowded with scales and lacerate-fringed stipules. Flowers sessile in small axillary 1 to 3-flowered clusters. Calyx tube $\frac{1}{4}$ to $\frac{1}{3}$ as long as the lobes, the 5 lobes membranous with a central lanceolate green spot. Sta-

mens 10, 5 fertile, the 5 lanceolate staminodes petaloid, each bearing at base a circular red scale. Style long but not exserted, 3-cleft. Fruit unknown.—(Herbae perennes caulibus erectis et foliis linearis. Folia caulinea e paribus aequalibus. Caudex brevis lignosus, squamis membranaceis et stipulis membranaceis fimbriatis dense confertis. Flores sessiles cymis parvis axillaribus 1 ad 3-floribus. Calycis lobi membranacei macula media virida lanceolata, tubo herbaceo ter vel quater longiores. Stamina 10, altera 5 filamentis antheriferis, altera 5 filamentis infertilibus petaloideis lanceolatis quibusque ad basin squamis rotundis rubris instructis. Stylus longus, apice breviter trifidus, non exsertus. Fructus ignotus.)—Species 1. (Greek eremos, desert, and lithos, rock, the plants growing in rocky places in the desert.)

1. **E. rixfordii** Jepson n. comb. (Figs. 99b and 100.) Stems several, branching, strict. 3 to 5 inches high; leaves 2 to 4 lines long; calyx $1\frac{1}{2}$ lines long, the staminodes as long as the calyx-lobes.

Rocky places, 4500 to 6000 feet, Inyo Co., eastward into southern Nevada.

Locs.—Owens Valley; Ash Mtns., Nev., *Purpus* 6032; Palmetto Range, Nev., *Purpus* 5843.

Refs.—*EREMOLITHIA RIXFORDII* Jepson. *Achyronychia rixfordii* Brandegee, *Zoe*, 1: 230 (1890), type loc. Owens Valley, *G. P. Rixford*.

14. **SCLERANTHUS** L. KNAWEL.

Indifferent annuals with subulate leaves and no stipules. Flowers small, greenish, clustered. Petals none. Calyx deeply 5-lobed, the cup-like tube indurated and enclosing the utricle. Stamens 10 or 5. Ovary 1-ovuled. Styles 2, distinct.—Species 10, in all Old World lands. (Greek scleros, hard, and anthos, flower, referring to the hardened calyx-tube.)

1. **S. annuus** L. GERMAN KNOTGRASS. Stems much branched, spreading, 2 to 3 inches long; flowers 1 to $1\frac{1}{2}$ lines long, sessile in the forks; calyx $1\frac{1}{2}$ lines long, its lobes narrowly scarious-margined.

Neighborhood of Placerville, *K. Brandegee*. Introduced from Europe.

Ref.—*SCLERANTHUS ANNUUS* L. *Sp. Pl.* 406 (1753), type European.



Fig. 100. *EREMOLITHIA RIXFORDII* Jepson; plant, x 1.

15. **VACCARIA** Medie.

Glabrous glaucous annual with sessile leaves and showy red flowers in a broad loose flat-topped corymb. Calyx synsepalous, ovate, with 5 prominent angles. Petals 5, clawed, not appendaged. Stamens 10. Styles 2. Ovary 1-celled but with rudimentary partitions at base. Capsule ovate, dehiscient at apex by 4 short teeth.—Species 3, Europe, Asia. (Latin *vacca*, cow, some species used for fodder.)

1. **V. vulgaris** Host. COW-HERB. Strictly erect, dichotomously branching above, 2 to 3 feet high; leaves ovate or the upper lanceolate, 3 to 4 inches long with cordate-clasping base; flowers 7 to 9 lines long; petals red, the blade obovate and claw linear.

Grain-field weed naturalized from Europe. Occurring rather widely in California but apparently not yet common.

Locs.—Dulzura, *I. Hagenbuck*, circa 1898; Berkeley, *Chesnut* in 1898; Sonoma (acc. *R. Kuhn* in 1914); College City, Colusa Co., *Alice King* in 1906; Plumas Co., *Platt* in 1891; Lundy, Mono Co., *Maud Minthorn*.

Refs.—*VACCARIA VULGARIS* Host, Fl. Austr. 1: 518 (1827); Jepson, Fl. W. Mid. Cal. 164 (1901). *Saponaria vaccaria* L. Sp. Pl. 409 (1753), type European.

16. **SAPONARIA** L. SOAPWORT.

Ours a stout perennial. Flowers white, in corymbed clusters. Calyx cylindric. Petals with a crest of 2 subulate teeth. Otherwise similar to *Vaccaria*.—Species about 20, northern hemisphere of the Old World. (Latin *sapo*, soap, the mucilaginous juice with saponaceous qualities.)

1. **S. officinalis** L. BOUNCING BET. Erect, 2 to 3 feet high, glabrous; leaves ovate, acute, 3 to 4 inches long; blade of petals euneate-obovate, notched at apex, 6 to 7 lines long.

Garden plant, native of Europe, spontaneous on sandbars of the Sacramento River below Delta. *Jepson* 6183.

Refs.—*SAPONARIA OFFICINALIS* L. Sp. Pl. 403 (1753), type European; Müller, Fl. Dan. 4: 543 (1827).

17. **VELEZIA** Loeßl.

Annuals with tough dichotomous stems and sparse foliage. Flowers pink, solitary in the axils of the subulate leaves, or in clusters of 2 or 3, divaricately divergent from the stem, borne on short peduncles or sessile. Calyx slender, elongated-cylindric, 15-ribbed, sharply 5-toothed. Petals small, with minute filiform erests, the blade in ours notched. Stamens 5. Styles 2. Capsule slender, terete, 4-valved at the summit.—Species 4, Mediterranean region. (Cristobal Velez, friend of Loeßling.)

1. **V. rigida** L. Stems slender, trailing, 4 to 8 inches long, in age readily breaking up at the joints; herbage glandular-puberulent; leaves subulate, 2 to 6 lines long; blade of petals 1 line long; capsule sheathed by the calyx, 6 to 7 lines long; seeds laterally menisoid.

Introduced from the Mediterranean region and locally established.

Locs.—La Grange, Sierra Nevada foothills, *Jepson* in 1896; Hupa Valley, Humboldt Co., *Jepson* 2120 in 1902.

Ref.—*VELEZIA RIGIDA* L. Sp. Pl. 332 (1753), type from s. Europe.

18. **SILENE** L. CATCH-FLY. CAMPION.

Annual or perennial herbs, more or less viscid and mostly large-flowered. Calyx tubular or inflated, 5-toothed. Petals 5, with long claws; junction of the claw and blade commonly furnished with 2 scales; blades spreading, entire, or more commonly cleft or lacinate. Stamens 10. Styles 3, rarely 4. Capsule opening by 3 or 6 teeth at apex.—Species 300, all continents except South America and Australia. (Greek *sialon*, saliva, the stems and other parts viscid.)

Calyx-ribs conspicuous, about 20-nerved; annual.....1. *S. multinervia*.
 Calyx 10-nerved, the nerves sometimes weak or obscure.

Annuals.

Internodes not glandular; flowers in one-sided racemes.....2. *S. gallica*.
 Upper internodes with a glandular black band; flowers in cymes or panicles.....
 3. *S. antirrhina*.

Perennials.

Flowers large, mostly $\frac{3}{4}$ to 2 inches broad (except no. 7); petals 4 to 6-cleft; stems leafy; mostly low altitudes (except no. 7).

Corolla crimson.

Plants 2 to 5 feet high; corolla $\frac{1}{2}$ to $\frac{3}{4}$ inch broad.....4. *S. laciniata*.
 Plants mostly $\frac{1}{2}$ to 1 foot high; corolla 1 to $1\frac{1}{2}$ inches broad.....
 5. *S. californica*.

Corolla white, yellowish or pink; plants mostly 3 to 7 inches high.

Herbage grayish; corolla much exserted.....6. *S. hookeri*.
 Herbage dull or yellowish green; corolla scarcely exserted.....7. *S. parishii*.

Flowers smaller, mostly 3 to 6 (or 10) lines broad.

Flowers solitary in the upper axils or terminal, the stems very leafy throughout.

Calyx broadly turbinate-campanulate; flowers nodding on deflexed pedicels;
 petals 4 to 6-cleft.....8. *S. campanulata*.
 Calyx broadly oblong; flowers erect; petals notched, the lobes divergent.....
 9. *S. menziesii*.

Flowers mostly scattered in a naked panicle or rarely solitary; stems mostly leafy at base or on lower part.

Flowers nodding or mostly so; stamens and style long-exserted.

Petals 4-cleft.....10. *S. lemmonii*.
 Petals 2-cleft.....11. *S. bridgesii*.

Flowers erect or mainly so; stamens and style included or little exserted.

Mostly of middle altitudes or on the sea coast.

Calyx campanulate, cleft to the middle or nearly, about $\frac{1}{2}$ as long as the corolla; petals 4-toothed; scales none.....12. *S. aptera*.

Calyx toothed at summit, its teeth relatively short; scales present.

Calyx narrowly cylindric.

Auricles none or feebly developed; scales long-lanceolate, entire.

Petals 4-cleft; capsule long-stiped.....13. *S. occidentalis*.

Petals 2-cleft; capsule sessile.....14. *S. pectinata*.

Auricles present; scales various; capsule stiped.

Petals 4-cleft; scales laciniate or fimbriate.

Ovary with minute valvular cap; claws glabrous; leaves mostly 2 to 6 lines broad.....
 15. *S. montana*.

Ovary with conspicuous valvular cap $\frac{1}{2}$ as long as the ovary; claws woolly; leaves mostly $\frac{1}{2}$ to 1 line broad.....
 16. *S. bernardina*.

Petals 2-cleft; scales entire or toothed, not fimbriate;

claws woolly.....17. *S. verecunda*.

Calyx oblong-campanulate; petals unequally 4-cleft; claws glabrous; sea coast.....18. *S. grandis*.

High montane, mostly above timber line; calyx broadly cylindric or oblong-campanulate.

Stems from a loosely branched crown.....19. *S. douglasii*.
 Stems caespitose.

Leaves 2 to 3 lines broad.....20. *S. grayi*.

Leaves mostly 1 line broad.....21. *S. watsonii*.

1. *S. multinervia* Wats. Annual; stems erect, simple or branching from the base, 7 to 16 inches high; herbage pubescent throughout, viscid-glandular above; leaves linear to lanceolate, 1 to 2 inches long; flowers short-pedicel in close terminal clusters on the unequal branches of the cymosely forked inflorescence, or on mostly long (3 to 15 lines) pedicels in the forks; calyx ovate, broadly so in fruit, 3 to 4 lines long, about 20-ribbed, the ribs strong and equally prominent; petal blades small, pink, 2-cleft with obtuse lobes,

without crests, not exceeding the subulate spreading calyx-teeth or very little; claws without auricles; capsule nearly sessile, ovate.

Coast region, Marin Co. south to Southern California.

Loes.—Mt. Tamalpais, *Michener & Bioletti*; Pt. Sur, *T. Brandegee*; Santa Inez Mts., *T. Brandegee*; Ojai Valley, *F. W. Hubby*; Santa Cruz Isl., *T. Brandegee*; Ramona, *Purpus*; Santa Catalina and Santa Cruz islands (*Zoe*, 1: 133).

Refs.—*SILENE MULTINERVIA* *Wats.* *Proc. Am. Acad.* 25: 126 (1890), type spms. from Jamul, San Diego Co., *Orcutt*, and Santa Cruz Isl., *Brandegee*; *Brandegee*, *Zoe*, 2: 121 (1891); *Jepson*, *Fl. W. Mid. Cal.* 164 (1901). *S. conoidea* *Brandegee*, *Proc. Cal. Acad. ser. 2*, 1: 202 (1888); *Zoe*, 1: 113 (1890); not *L.*

2. *S. gallica* *L.* WINDMILL PINK. Erect, simple to freely branched, 10 to 15 inches high, hirsute or hispidulous with spreading hairs; leaves spatulate-obovate, 1 to 1½ inches long; flowers in a mostly 1-sided raceme on very short (1 to 2 lines long) pedicels; corolla white or flesh-color, 3 to 4½ lines broad; petal blades obovate and entire, the scales small; ovary almost completely 3-celled.

Naturalized from Europe; everywhere in fields and along roadsides, the only common pink. Apr.-May. The petals are commonly twisted one-fourth round or nearly so, thus resembling the fans of a turbine windmill. Flowers not withering early in the morning.

Refs.—*SILENE GALLICA* *L.* *Sp. Pl.* 417 (1753), type from France; *Jepson*, *Fl. W. Mid. Cal.* 165 (1901). *S. anglica* *L.* *Sp. Pl.* 416 (1753).

S. DICHOTOMA *Ehrh.* *Beit.* 7: 143 (1792). Tall, pubescent; leaves lanceolate or oblanceolate, acute; flowering stems forking, one flower in each fork, the others racemose; corolla pure white, versipertine, 6 to 8 lines broad; petal blades bifid.—European plant once adventive at Berkeley (*Fl. Fr.* 116) but not collected in recent years.

3. *S. antirrhina* *L.* SLEEPY CATCHFLY. Stems erect, slender, sparingly branched, 1 to 2½ feet high; herbage minutely puberulent below, mainly glabrous above, the upper internodes with a black glandular band at the middle; leaves oblong-lanceolate or linear, 1 to 2 inches long; inflorescence paniculate; pedicels 3 to 6 lines long, filiform; flowers small; petals pink or red, emarginate, the blade 1 line long; crests minute; capsule ovoid, 3 lines long.

Sandy soil. Throughout California, but nowhere common.

Loes.—Bakersfield, *Davy* 1863; Yosemite, acc. *Hall*; McCowin's Bridge, Calaveras Co., *Blasdale*; Egg Lake, Modoc Co., *M. S. Baker*; Sisson, *Jepson*; Buck Mt., Humboldt Co., *Tracy* 2801; Elk Mt., Lake Co., *Jepson*; Scotts Valley, Lake Co., *Tracy* 1732; St. Helena, *Jepson*; Redwood Cañon, Marin Co., *Michener & Bioletti*; Clayton, *Chesnut & Drew*; Big Sur River, *Davy* 7442; Arroyo Grande, *Alice King*; Palm Cañon, San Jacinto Mts., *Jepson* 1367; Witch Creek, *Alderson*; San Diego, *Orcutt*; Santa Catalina, Santa Cruz and San Miguel islands (*Zoe*, 1: 133).

Refs.—*SILENE ANTIRRHINA* *L.* *Sp. Pl.* 419 (1753), type spms. from Va. and Carolina; *Jepson*, *Fl. W. Mid. Cal.* 165 (1901).

4. *S. laciniata* *Cav.* Stems branching from the base, stiffly erect or climbing amongst bushes, knotty below, 2 to 5 feet high; herbage finely scabrous-puberulent and a little glandular; leaves elongated and narrowly lanceolate, or linear-lanceolate, and acute, sometimes varying to obovate, 2 to 6 inches long, narrowed to a sessile base; flowers terminal on the branches of a naked panicle, sometimes in clusters, crimson, ½ to ¾ (or 1) inch broad; calyx cylindric, 8 to 9 lines long, its obtuse teeth 1 line long; petals narrow, deeply 4-cleft into lanceolate divisions; crests erect, denticulate; capsule oblong, usually exerted at maturity.

Southern California from the coast inland to the San Jacinto Range, ascending in the chaparral to 3500 and 5300 feet; north along the coast to San Luis Obispo, Monterey, and Santa Cruz cos. In the Santa Cruz region it apparently

overlaps the southerly extension of *S. californica*. South into Mexico and east to New Mexico.

Loes.—San Diego, *T. Brandegee*; Augustine's Ranch, Palomar, *Jepson* 1548; Mt. San Jacinto, *Geo. F. Reinhardt*; San Bernardino foothills, *Parish*; Santa Monica Mts., *Barber*; Santa Cruz Isl., *Frída Sezauc*; Ojai Valley, *F. W. Hubby*; Arroyo Grande, *Alice King*; Santa Cruz Co. (acc. Anderson, Nat. Hist. Santa Cruz, 36).

Refs.—*SILENE LACINIATA* Cav. Ic. 6: 44, t. 564 (1801), type loc. Mexico; Lindl. Bot. Reg. t. 1444 (1831). *S. simulans* Greene, Pitt. 1: 63 (1887), type spms. from Santa Cruz and San Miguel islands; (cf. Zoe, 1: 133).

5. ***S. californica* Dur.** INDIAN PINK. (Fig. 101.) Stems 1 or several from a stout taproot, erect or half-erect, very leafy, $\frac{1}{2}$ to 1 foot high or reclining amongst bushes and up to $3\frac{2}{3}$ feet high; herbage puberulent and more or less glandular; leaves elliptic-ovate or ovate to oblanceolate, more or less abruptly acuminate, 1 to $3\frac{1}{2}$ inches long; pedicels $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; calyx oblong, soon turbinate- or obovate-distended, 7 to 11 lines long, its teeth lanceolate; corolla crimson, 1 to $1\frac{1}{4}$ inches broad; petals deeply 4-cleft, the middle segments the longer, all the segments toothed, or the lateral entire or rarely all entire; scales 2 to 4, conspicuous, incurved; capsule obovoid, 6 to 8 lines long, not exceeding the broad calyx; seeds regularly papillate, the papillae with a depression in the center.



Fig. 101. *SILENE CALIFORNICA* Dur.; flower, x $1\frac{1}{2}$.

Open woods of cañons: Sierra Nevada; Tehachapi Range; Coast Ranges from Del Norte Co. at least as far south as Santa Clara and Santa Cruz cos. Our most widely distributed native species in central and northern California. Extends into the corner of southwestern Oregon. June.

Loes.—Red Hill, Del Norte Co., *Jepson* 2904; Tehama Co., *Jepson*; Redwood Creek, Humboldt Co., *Jepson* 1962; Cahto, Mendocino Co., *Jepson*; Comptche, *Harriet Walker* 387; Mt. Konocti, *Jepson*; Cache Creek Cañon, *C. F. Baker* 2978; Howell Mt., *Tracy* 2208; Berkeley Hills, *Davy*; Lake Pillsbury, *Davy* 1158; Loma Prieta, *Davy* 272. Sierra Nevada, 2000 to 5000 feet: Morley's Sta., Shasta Co., *M. S. Baker*; Spanish Peak, Plumas Co., *R. M. Austin*; Blue Cañon, *Harriet Walker* 1253; Middle Tule River, *Jepson* 4863; San Emigdio Cañon, *Davy* 2067.

Refs.—*SILENE CALIFORNICA* Dur. Jour. Acad. Phil. ser. 2, 3: 83 (1855), type loc. Deer Creek, Nevada City, *Pratten*; *Jepson*, Fl. W. Mid. Cal. 165 (1901). Var. *subcordata* Rob. Leaves suborbicular, shortly acuminate, the subcordate base sessile.—Blue Cañon (acc. Syl. Fl. 1st: 218).

6. ***S. hookeri* Nutt.** Stems several, 3 to 5 inches high, erect or decumbent, arising from slender rootstocks derived from the crown of a perennial taproot; herbage grayish pubescent or glabrate; leaves obovate to oblanceolate, attenuate at base, acute at apex, 1 to 2 inches long; flowers few, solitary in the upper axils, or often only a single terminal one; calyx at first clavate-tubular, 8 to 10 lines long, $1\frac{1}{2}$ to 2 lines broad, its lanceolate teeth $\frac{1}{4}$ as long as the tube; calyx in age strongly turbinate, becoming $\frac{1}{2}$ lines broad; corolla white or pink, 1 to 2 inches broad; petals deeply slashed into 4 lacinate or linear entire or cleft lobes; crests conspicuous, only the very tips free, entire or notched; capsule globose-ovate.

Open woodlands. Mendocino Co. north to western Oregon. May-June.

Loes.—Willits, *Davy* 5096; Cahto, *Jepson* 1853; Long Valley, Mendocino Co., *Bolander* 4696; Graham's, Humboldt Co., *Blasdale*; Klamath River, Humboldt Co., *Chandler* 1539. Myrtle Creek, Ore., *Patsy Ann Wiley*.

Refs.—*SILENE HOOKERI* Nutt.; T. & G. Fl. 1: 193 (1838), type loc. woods of the Willamette, Ore., *Gardiner*; Hook. f., Bot. Mag. t. 6051 (1873).

7. **S. parishii** Wats. Stems several from the slender branching crown of a fleshy taproot, 4 to 7 or 10 inches high; herbage including the calyx densely pubescent; leaves narrowly or sometimes broadly lanceolate to oblanceolate, acuminate, $\frac{3}{4}$ to $1\frac{1}{4}$ inches long; flowers in terminal 1 to 4-flowered clusters; calyx yellowish, broadly cylindric, 8 to 11 lines long, the lanceolate teeth 2 to 3 lines long; corolla white or lemon-yellow, little exerted from the calyx, about 5 to 7 lines broad, the blades of the petals cut nearly to base into about 4 narrowly lanceolate or subulate segments, with a supplementary tooth on each side at base; seeds with a double marginal crest of flattened tubercules.

Among rocks or in loose granitic soil in pine forest: San Bernardino and San Jacinto mountains, 8000 to 11,000 feet.

Locs.—Near Mt. San Geronio, *Blasdale*; Santa Ana Cañon, San Bernardino Mts., *Hall* 7680; Tauquitz, Mt. San Jacinto, *Jepson* 2303; Santa Rosa Peak, *Jepson* & *Hall*.

Refs.—*SILENE PARISHII* Wats. Proc. Am. Acad. 17: 366 (1882), type loc. San Bernardino Mts., *S. B. & W. F. Parish*; Merritt, *Erythra*, 4: 147 (1896).

8. **S. campanulata** Wats. Stems erect, leafy, many from the thick crown of a perennial taproot, 9 to 11 inches high; herbage green, finely glandular-puberulent to glabrous; leaves oblanceolate to ovate, acute to acuminate, sessile, $\frac{3}{4}$ to 1 inch long; flowers racemose, on deflexed pedicels 3 to 4 lines long; calyx broadly campanulate, 4 to 6 lines long, its broad rounded teeth $\frac{1}{3}$ to $\frac{1}{2}$ as long as the tube; petals greenish white or flesh-tinted, 4 to 6-cleft into linear lobes, the lobes 2-cleft at apex; auricles broad; scales well developed, several cleft and toothed.

North Coast Ranges from northern Mendocino to Humboldt Co. North to southern Oregon.

Locs.—In the matter of leaf breadth, the typical form of the species exhibits rather narrow or lanceolate leaves, while the var. *greenii* Wats. has ovate leaves. Since narrow and broad leaves may, however, occur in one set of individuals, leaf breadth is evidently not of varietal importance. Both narrow and broad leaf forms, moreover, are represented by glandular-puberulent and by glabrous individuals. On the other hand the species is not to be regarded as strictly monotypic, and the specimens before us may be more consistently segregated in the following way. **Typical:** Finely glandular-puberulent, leaves varying in breadth from oblanceolate to ovate.—Red Mt., *Bolander* 6517; Mad River, Humboldt Co., *Blasdale*; Cudahay Valley, w. Siskiyou, *Jepson* 2855; Humbug road, Siskiyou, *Butler* 772. Var. ***greenii*** Wats. Finely and often rather densely pubescent to glabrous, but not at all or scarcely glandular.—Highland Mine, *Butler* 962 (finely pubescent, leaves ovate); Shackleford Cañon, *Chandler* 1715 (glabrous, leaves lanceolate); Log Lake, w. Siskiyou, *Butler* 59 (glabrous, leaves ovate). Var. ***petrophila*** Jepson n. var. Stems and leaves puberulent, not glandular, glaucous; leaves ovate; petals pale yellow.—(Caules foliaque puberulenta glauca, non glandulosa; folia ovata; petala flava.)—Rocky ridge near Salmon Summit, *Jepson* 2076a.

Refs.—*SILENE CAMPANULATA* Wats. Proc. Am. Acad. 10: 341 (1875), type loc. Red Mt., n. Mendocino, *Bolander* 6517, *Kellogg*. Var. ***GREENII*** Wats. in Rob. Proc. Am. Acad. 28: 137 (1893), type spms. from Yreka, Cal., and s. Ore. Var. ***orbiculata*** Rob. in Gray, Syn., Fl. 1^a: 219 (1897), type loc. Hettenschow, Trinity Co., *Blankinship*. Leaves roundish, shortly acuminate, $\frac{1}{2}$ inch broad; herbage tomentulose.—Ex. char.

9. **S. menziesii** Hook. Stems slender, erect, very leafy, 3 to 11 inches high, arising from slender branching rootstocks derived from a perennial root; herbage puberulent; leaves obovate to oblanceolate, tapering to base, acute or short-acuminate at apex, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; flowers few in the axils of the reduced upper leaves, on pedicels 4 to 6 (or 15) lines long; calyx oblong, 2 to 3 lines long; corolla 3 to 4 lines broad; petals narrowly fan-shaped, deeply and broadly notched, with or without small lateral teeth; claws without crests or with small ones.

Sierra Nevada, 3000 to 9000 feet, south to the San Bernardino Mts., north to Modoc Co., thence west to Humboldt Co. Far north to British America, east to Missouri. Strongly resembling *Arenaria macrophylla*.

Locs.—Hyampum, Humboldt Co., *Chesnut & Drew*; McCloud River near Bartles, *M. S. Baker*; Sugarloaf Hill, Modoc Co., *R. M. Austin*; Lassen Creek, *R. M. Austin*; Tuolumne Soda Springs, *Chesnut & Drew*; upper San Joaquin, Madera Co., *Congdon*; Bubbs Creek, *Jepson* 799; Junction Mdw., Kern River, *Jepson* 5018; Bear Valley, San Bernardino Mts., *Hall*.

Ref.—*SILENE MENZIESII* Hook. Fl. Bor. Am. 1: 90, t. 30 (1830), type spms. from North-west America.

10. ***S. lemmonii* Wats.** (Fig. 102a.) Stems slender, erect, very leafy at base, 8 to 14 inches high, arising from the slender branched rootstocks crowning a deep-seated taproot; herbage puberulent and somewhat glandular; basal leaves narrowly obovate, acute, narrowed at base, $\frac{3}{4}$ to $1\frac{1}{4}$ inches long; stem leaves similar or linear or lanceolate, the upper remote and much reduced; flowers nodding, in a narrow few-flowered panicle; calyx 3 to $3\frac{1}{2}$ lines long, oblong (soon turbinate-distended by the ovoid capsule), scarious, with 10 green nerves, the alternate ones ending in the short rounded teeth; corolla dull or pale yellowish white, 4 to 6 lines broad; blade of petals 4-cleft into linear-subulate segments, the segments entire or rarely lobed; scales entire or 2-toothed, erect; auricles broad, rounded; claws woolly-pubescent; stamens long-exserted, twice as long as the corolla.

Open pine forest, 4000 to 6500 feet, Sierra Nevada. The most common species in the coniferous belt.

Biol. Note.—The flowers open in the evening, the petal blades stiffly spreading, at first reflexed, later rotate; during the next morning the segments coil inwards from the tip, remain closely coiled all day and do not, so far as we have observed, uncoil again. The stamens are physiologically in 2 sets of 5 each: the first set becomes long-exserted, the second set meanwhile remaining coiled at mouth of calyx tube; when the first 5 relax, the second 5 elongate; the flowers are protandrous and the very long styles follow the second set of stamens or overlap them somewhat during the latter part of their period of anthesis. The procedure in this species probably does not differ essentially in the related species.

Locs.—Sierra Nevada: Egg Lake, Modoc Co., *M. S. Baker*; ne. Shasta Co., *Hall & Babcock* 4126; Lassen Peak, *Jepson* 4096; Mt. Harkness, Plumas Co., *Jepson* 4122; Blue Cañon, Placer Co., *Harriet A. Walker* 1233; Fallen Leaf Lake, *M. S. Baker*; Yosemite Valley, *Jepson* 4260; Little Yosemite, *Jepson* 3162; Chilnualna Creek, Mariposa Co., *Congdon*; Hazel Green to Big Meadows, *Jepson*; Pine Ridge, Fresno Co., *Hall & Chandler* 70; Round Mdw., Giant Forest, *Jepson* 706. North Coast Ranges: Sisson, *Jepson*; Dyer's Ranch to Hawkins Bar, Trinity Co., *Jepson* 1990; Snow Mt., *T. Brandegee*. Southern California: Mt. Wilson, *Geo. B. Grant*; Job's Peak, San Bernardino Mts., *Parish* 2336; Seven Oaks, *Parish* 3729; Cuyamaca Mt., *T. Brandegee*.

Refs.—*SILENE LEMMONII* Wats. Proc. Am. Acad. 10: 342 (1875), type loc. Sierra Co., *Lemmon*. *S. palmeri* Wats. l. c. 11: 124 (1876), type loc. Cuyamaca Mts., *Palmer*. *S. longistylis* Engelm.; Wats. l. c. 22: 469 (1887), type spms. from Scott Mts., Cal., *Engelmann*, and Ashland Butte, Ore., *Henderson*. *S. deflexa* Eastw. Bot. Gaz. 41: 284 (1906), type loc. "above the lakes," Cañon Creek, Trinity Co., *Vernon Bailey*.

11. ***S. bridgesii* Rohrb.** Stems 1 to 4 from the crown of a taproot, leafy, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high; herbage glandular-puberulent; leaves sessile, lanceolate to oblanceolate, acute or acuminate, sometimes varying to oblong-lanceolate, 1 to $2\frac{1}{2}$ inches long; flowers nodding, verticillately racemose or in a narrow loose panicle with spreading branches; calyx nearly cylindric, soon clavate or obovate in fruit, 3 to 5 lines long, the teeth acute or lanceolate, $\frac{1}{4}$ to $\frac{1}{3}$ as long as the tube; corolla white or purplish, 5 to 8 lines broad; petal blades 2-cleft into linear segments; crests lanceolate; stamens and style long exserted; capsule ovate-globose.

Central and southern Sierra Nevada, 4000 to 8700 feet.

Locs.—Near Jackson, *Hansen* 525; Rosaseo's, Tholumne Co., *Chesnut & Drew*; Yosemite Valley, *Bioletti*; Snow Creek, Mariposa Co., *Congdon*; Sequoia Mills (now Millwood), *T. Brandege*; Old Colony Mill, Sequoia Park, *Jepson* 629; North Middle Tule River, *Purpus* 5596.

Refs.—*SILENE BRIDGESII* Rohrb. App. Ind. Sem. Berol. 1867, 5, type from "California, Bridges"; Monog. Gatt. *Silene*, 204 (1868). *S. incompta* Gray, Proc. Am. Acad. 7: 330 (1868), type spms. from Mt. Bullion and Yosemite, *Bolander*.

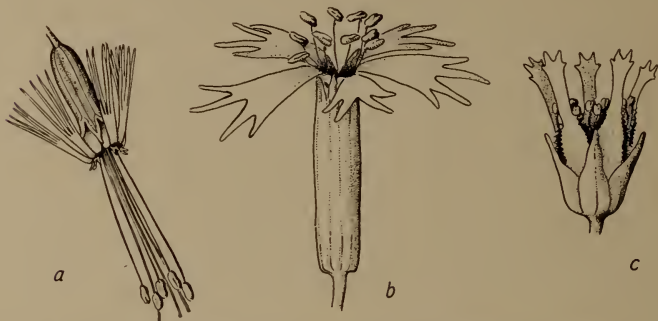


Fig. 102. *a*, *SILENE LEMMONII* Wats., flower. *b*, *SILENE OCCIDENTALIS* Wats., flower. *c*, *SILENE APTERA* Greene, flower. Drawn from dried specimens. x 2.

12. *S. aptera* Greene. (Fig. 102c.) Stems very slender, erect, 9 to 14 inches high, one or several from the condensed crown of a taproot, the leaves chiefly basal, the stems with mostly a single pair at or near the middle; herbage minutely pubescent; leaves linear or linear-subulate, $1\frac{1}{2}$ to $3\frac{1}{4}$ inches long, $\frac{1}{2}$ to $1\frac{1}{4}$ lines wide; stems 1-flowered, or few-flowered and loosely cymose; calyx campanulate, $3\frac{1}{2}$ to $4\frac{1}{2}$ lines long, cleft to the middle or below into lanceolate acute scarious-margined lobes; corolla nearly twice as long as the calyx, 5 to 7 lines broad; petal blades shallowly 4-notched or -lobed, the broad claws hairy-tomentulose; scales and auricles none; capsule oblong, exceeding the calyx.

Hockett Meadows, Tulare Co., 8500 to 9000 feet. A distinct species with ampler characters than hitherto indicated.

Ref.—*SILENE APTERA* Greene, Leaflets, 1: 75 (1904), type loc. Hockett Meadows, *Culbertson*, July 16, 1904.

13. *S. occidentalis* Wats. (Fig. 102b.) Stems erect, 13 to 19 inches high, 1 to 4 from the crown of a stout taproot; herbage viscid-glandular; basal and lower leaves narrowly obovate or oblanceolate, acute, narrowed gradually at base into a long slender margined petiole, 2 to $4\frac{1}{2}$ inches long, the upper linear or lanceolate, acuminate, 1 to 2 inches long; flowers terminal on the forks of a loosely branched panicle; calyx narrowly tubular or soon slightly distended above the middle, 6 to 9 lines long, its teeth obtuse; corolla purple or dull white, 6 to 10 lines broad; petal blades cuneate, cleft half way into 4 or 5 linear or lanceolate segments; claws without teeth or auricles; scales linear or lanceolate, nearly entire; capsule oblong-cylindric, 5 to 6 lines long, on a stipe 2 lines long.

Northern Sierra Nevada, 4400 to 6000 feet, from Alpine Co. north to Modoc Co.; Tulare Co., southern Sierra Nevada. The pedicels of the lateral flowers are mostly 3 to 8 or 12 lines long, while in *S. pectinata* and *S. montana* the lateral flowers are usually on shorter pedicels or often subsessile.

Loes.—Upper Clover Creek, Shasta Co., *M. S. Baker* 316; Silver Lake, Modoc Co., *M. S. Baker*; Prattville, *T. Brandegec*; Plumas Co., *Platt*; Cisco, *Hall* 8709; Tallac, *C. J. Fox, Jr.*

Var. **nancta** Jepson n. var. Panicles loose, broad, with white flowers; blade of the petals cut into 2 divergent lanceolate lobes, each with one small lateral tooth; scales lanceolate, very long, entire. (*Panicula laxa lata*; flores albi; petalorum lamina bifida, lobis divergentibus laterale 1-dentatis; squamae lanceolatae longissimae integrae.)—Hockett Mdw., Tulare Co., *Jepson* 4685.

Ref.—*SILENE OCCIDENTALIS* Wats. Proc. Am. Acad. 10: 343 (1875), type loc. Sierra Co., Lemmon.

14. ***S. pectinata*** Wats. (Fig. 103a.) Stems erect, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, 1 or 2 (or several) from the crown of a stout taproot, the leaves in a coarse tuft at base or the lower part of the stem with a few remote pairs; herbage very gummy or glandular-pubescent; leaves elliptic-ovate to lanceolate, acute or acuminate, 2 to $3\frac{1}{2}$ inches long; flowers erect, few in a narrow or rather strict panicle; calyx cylindric, soon turbinate-distended or ovoid, 5 to 6 lines long, the teeth long-lanceolate, $\frac{1}{3}$ to $\frac{1}{2}$ as long as the tube and usually ex-

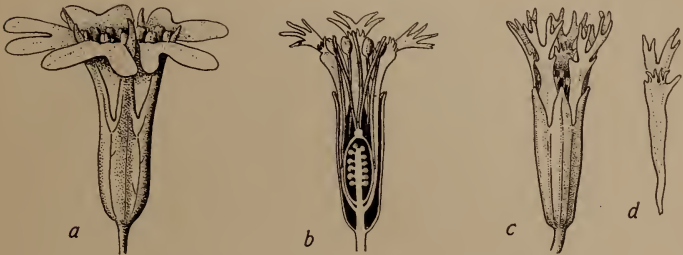


Fig. 103. a, *SILENE PECTINATA* Wats., flower. b, *SILENE MONTANA* Wats., longitudinal median section of a flower showing the petals, stamens and ovary raised on a stipe. c, *SILENE BERNARDINA* Wats., flower; d, petal. Drawn from dried specimens. x 2.

ceeding the mature capsule; corolla deep red, 6 to 8 (or 9) lines broad; petal blades cuneate, broadly notched, with rounded lobes; scales lanceolate or subulate, entire or notched; capsule ovoid, sessile or nearly so, 3 to 4 lines broad.

Eastern slope of the northern Sierra Nevada, 2500 to 4500 feet, from Mono Co. to Lassen Co., thence westerly on the interior plateau to northeastern Shasta Co. Adjacent Nevada.

Loes.—Upper Fall River Valley, *Jepson* 5762; Honey Lake, *T. Brandegec*; Sierra Valley, *Lemmon*; Sonora trail, 14 miles east of summit, *Brewer* 1875. King's cañon, Ormsby Co., Nev., *Baker* 1103.

Refs.—*SILENE PECTINATA* Wats. Proc. Am. Acad. 10: 344 (1875), type spms. said to be from near Carson City, Nev. (*C. L. Anderson*), Walkers Meadows (*Brewer* 1857), and Plumas Co. (*M. P. Ames, Lemmon*). We have no specimens from the western slope of the Sierra Nevada.

15. *S. montana* Wats. (Fig. 103b.) Stems several to many, erect, 9 to 16 inches high, from the branching crown of a taproot; herbage puberulent, glandular above; leaves narrowly linear-lanceolate or -oblanceolate, 1 to $2\frac{1}{4}$ inches long; flowers in a spicate panicle; calyx cylindric, soon clavate-distended, 6 to 7 lines long, its short teeth very acute and narrowly scarious-margined; corolla greenish white to rose, 4 to 7 lines broad; petal blades cut at apex into 4 (or 6) narrow segments; scales 2, fimbriate or toothed; auricles roundish, commonly denticulate; filaments scarcely exerted; capsule slender-cylindric, tapering to apex, 4 to 5 lines long, included, its stipe $1\frac{1}{2}$ to 2 lines long.

Sierra Nevada and desert region adjoining on the east, 4000 to 6500 feet; inner North Coast Range.

Locs.—Janesville, *T. Brandegee*; Lake Tahoe, *Blasdale*; Crane Creek, Yosemite Park, *Jepson* 4646; Mineral King, *Hall & Babcock* 5586. Mt. Hull, Lake Co., *Hall* 9540.

Refs.—*SILENE MONTANA* Wats. Proc. Am. Acad. 10: 343 (1875), type spms. from Carson City, *Anderson*, and Big Meadows, Plumas Co., *Lemmon*. *S. shockleyi* Wats. l. c. 25: 127 (1890), type loc. White Mts., Mono Co., *W. H. Shockley*, a synonym acc. Robinson in Gray, Syn. Fl. 1': 220.

16. *S. bernardina* Wats. (Fig. 103c, d.) Stems erect, densely leafy at base, 7 to 15 inches high, several to many from the loosely branching crown of a stout taproot or sometimes caespitose; herbage dark green, glandular-puberulent throughout, or often grayish pubescent below; leaves grass-like, narrowly linear- or subulate-lanceolate, acuminate, 10 to 16 lines long, $\frac{1}{2}$ to 1 (or 2) lines wide; flowers in a narrow panicle; calyx cylindric, at length turbinate-distended, 6 lines long, its teeth broadly lanceolate, acute, scarious-margined, 1 to $1\frac{1}{2}$ lines long; corolla white, nearly half longer than the calyx, 3 to 4 lines broad; petal blades 4-cleft, or deeply 2-cleft with the divergent lobes again 2-cleft to middle; claws commonly sparingly woolly on lower part; scales long, lacinate nearly or quite to the base; auricles rounded or lanceolate; capsule ovoid, $3\frac{1}{2}$ to 4 lines long, long-stiped.

Southern Sierra Nevada, 5000 to 8000 feet.

Locs.—Kearsarge Mill (below Kearsarge Pass), *Jepson* 901; Tulare Co., *Hall & Babcock* 5558 (Kern Cañon at East Fork), 5343 (Coyote Meadows), 5142 (Salmon Creek).

Ref.—*SILENE BERNARDINA* Wats. Proc. Am. Acad. 24: 82 (1889), type loc. Long Meadow, south of Mt. Whitney, *Palmer* 185. The specific name used by Watson is inexplicable.

17. *S. verecunda* Wats. (Fig. 104a.) Stems erect or decumbent, several from the branching crown of a stout taproot, leafy along the lower part of the stem and also very leafy at base, $\frac{1}{2}$ to 1 foot high; herbage finely pubescent below, glandular-viscid above; leaves linear-lanceolate, acuminate; flowers in 1 to 3-flowered peduncled clusters scattered along the simple or sparingly branched flowering stems, the pedicels short and stout; calyx densely pubescent and also glandular, cylindric, 5 to 6 lines long, or becoming clavate or obovate as the fruit develops; corolla rose-color, 4 to 6 lines broad; petal blades cleft to the middle into 2 entire or slightly toothed oblong lobes, and with 2 nearly obsolete lateral lobes or rounded teeth; scales broadly oblong, obtuse or often notched; claws woolly pubescent; auricles rounded; capsule ovoid, slightly exerted, sessile or stiped; seeds papillate, the papillae developed into a crest on the margin.

South Coast Ranges. May-Sept. The stipe is very variable in length.

Locs.—Lone Mt., San Francisco, *Chandler*; Presidio, San Francisco, *Jepson*, *Tidestrom*. Only the plants of the San Francisco peninsula are truly typical. The plant on Mt. Diablo (*Greene*) seems different but we are unable to segregate it varietally. We lack material to define the limits southward but presumably the species must, at least provisionally, include the

plants of San Luis Obispo Co. and of the southern coast stations as far as the Santa Ana Mts. There is a plant from Mt. Wilson (*Davidson*) which is remarkably canescent but too little known. A specimen from the summit of Mt. San Antonio, *Suñr*, is more glandular than typical plants but strikingly like them. The remaining material before us, of the high ranges and mostly away from the coast, is very different in aspect from the type, but careful dissections and comparison of field notes fail to give any constant characters for specific separation, a dilemma which previously confronted Robinson (in Gray, *Syn. Fl.* 1': 221). While it is thus confessedly difficult to locate a definite break in the series, the differences in habit seem, however, somewhat related to the geographical distribution and the montane material is here taken as constituting a form of varietal status:

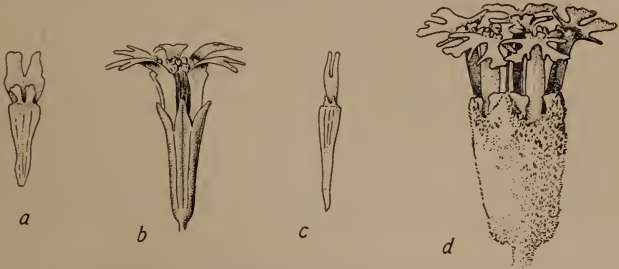


Fig. 104. *a*, *SILENE VERECUNDA* Wats., petal. *b*, var. *PLATYOTA* Jepson, flower; *c*, petal. *d*, *SILENE GRANDIS* Eastw., flower. x 2.

Var. **platyota** Jepson n. comb. (Fig. 104*b, c.*) Stems slender, branching above and forming a mostly open panicle with scattered flowers on long pedicels or sometimes in 3-flowered short-peduncled clusters; basal leaves oblong- to linear-ob lanceolate, narrowed at base to a margined petiole, $1\frac{1}{2}$ to 4 inches long; calyx lightly pubescent; petals pink, purple, or (?) greenish white, very narrow; scales mostly lanceolate or linear; auricles rounded or acute.—High montane, 5000 to 9000 feet, mountains of Southern California to the southern Sierra Nevada.

Locs.—Cuyamaca Mts., acc. *Watson*; Mt. San Jacinto, *Jepson* 2313; Seven Oaks, San Bernardino Mts., *Parish* 3728; Lytle Creek Cañon, San Gabriel Mts., *Hall* 1242; Mt. Gleason, *Barber* 257; Pahute Peak, *Purpus* 5309; Collins Mdw., Fresno Co., *Hall & Chandler* 458.

Refs.—*SILENE VERECUNDA* Wats. *Proc. Am. Acad.* 10: 344 (1875), type loc. rocky hills near Mission Dolores, San Francisco, *Bolander* 352; *Jepson*, *Fl. W. Mid. Cal.* 165 (1901). *S. luisana* Wats. l. c. 23: 261 (1888), type spms. from San Luis Obispo, *Lemmon*, and *Jolon*, *T. Brandegee*; a synonym acc. *Robinson* in Gray, *Syn. Fl.* 1': 221. Var. *PLATYOTA* *Jepson*. *S. platyota* Wats. l. c. 17: 366 (1882), type spms. from Cuyamaca, San Jacinto and San Bernardino mountains.

18. **S. grandis** Eastw. (Fig. 104*d.*) Stems $\frac{3}{4}$ to 2 feet high, very stout, strongly thickened at the nodes, unbranched, densely leafy, bearing peduncled or subsessile clusters of flowers in the axils of the somewhat reduced upper leaves; stem leaves roundish-ovate, shortly acute, 1 to 2 or 3 inches long, sessile or drawn down to a margined petiole, the pairs connate-clasping by a broad base; basal leaves similar but long-petioled; calyx oblong-campanulate, 5 to 7 lines long, scarious between the green nerves, which are densely hairy or velvety, its teeth roundish, scarious margined; petal blades unequally 4-cleft, the two middle ones longer, truncate, toothed or shortly cleft, the lateral very small, lanceolate, strongly divergent; scales quadratisht, truncate, toothed; claws glabrous; auricles narrow, rounded; capsule oblong, stipitate, slightly exceeding calyx.

Sea bluffs of Marin and Sonoma cos.

Locs.—Pt. Reyes, *Davy* 6876; Bodega Head, *K. Brandegee*.

Var. **pacifica** Jepson n. comb. Much more slender and less densely leafy; leaves narrower, the basal 2 to 3 inches long on petioles nearly twice as long; claws glabrous.—Sea coast, central and northern California. A transition to *S. verecunda*.

Locs.—San Francisco, *K. Brandegee*; s. Marin Co.; Bucksport near Eureka, *Tracy* 2141.

Refs.—*SILENE GRANDIS* Eastw. Bull. Torr. Club, 30: 487 (1903), type loc. Bodega Pt., *Eastwood*. Var. *PACIFICA* Jepson. *S. pacifica* Eastw. Bot. Gaz. 41: 285 (1906), type loc. Rodeo Lagoon, near Pt. Bonita, Marin Co., *Eastwood*.

19. **S. douglasii** Hook. var. **monantha** Rob. Stems erect, several from the loosely branching crown of a taproot, 10 to 20 inches high, the leaves chiefly basal, the stem with mostly 1 or 2 remote pairs; herbage very minutely pubescent or nearly glabrous, especially below; leaves linear-lanceolate to oblanceolate, tapering to both ends, 1 to 2½ inches long; stems (or the main branches) 1 or more commonly 3 to 5-flowered; calyx oblong-cylindric, soon inflated and oblong-campanulate, 6 to 7 lines long, its teeth roundish, often a little constricted at base, obtuse at apex or at length with the membranous margins inflexed and thus acute; corolla dull white, 5 to 8 lines broad; petal blades 2-cleft, its lobes entire; claws somewhat exerted; seales oblong, entire; auricles obtuse or acute; capsule elliptic or oblong, 4 to 5 lines long, included, on a stipe 1½ lines long.

Sierra Nevada, 6000 to 8000 feet, from Placer Co. north to Modoc Co., thence to western Siskiyou. North to Washington.

Locs.—Fallen Leaf Lake, *Hall* 8773; Cisco, Placer Co., *Hall* 8728, 8742; between Donner Lake and Coldstream, *Heller* 6957; Tallac, El Dorado Co., *C. J. Fox, Jr.*; Nevada Co., *Carpenter*; Lower Sardinia Lake, Sierra Co., *Hall & Babcock* 4491; Dixie Valley, Lassen Co., *Baker & Nutting*; Mt. Bidwell, *Mary H. Manning*; Highland Mine, Siskiyou Co., *Butler* 963.

Specimens from Sierra, Placer and El Dorado counties in the northern Sierra Nevada are very uniform in habit save in number of flowers on the flowering stems. One finds specimens with the stems 3 or 5-flowered, rarely 7-flowered. Less commonly plants are found with all the stems 1-flowered, but frequently plants show all these variations on a single individual. In his revision of *Silene*, Williams, whose material was evidently scanty, disposes of *S. monantha* Wats., the type of which is simply the 1-flowered state, in the subgenus *Gastrosilene* and places *S. douglasii* Hook. (the many-flowered original form) in the subgenus *Eusilene*. In the absence of ample material a specific unit may thus be broken and separated, by applying too rigidly the characters of defined subgenera, which nevertheless may be sound in principle.

Refs.—*SILENE DOUGLASII* Hook. Fl. Bor. Am. 1: 88 (1829), type spms. collected above the Grand Rapids of the Columbia and on the western slope of the Rocky Mts. by *Douglas*. Williams, Jour. Linn. Soc. Bot. 32: 143 (1896). Var. *MONANTHA* Rob. Proc. Am. Acad. 28: 145 (1893). *S. monantha* Wats. Proc. Am. Acad. 10: 340 (1875), type loc. Castle Rock, Cascade Mts., Wash., *Kellogg & Harford*. *S. lyallii* Wats. at least as to Californian distributions.

20. **S. grayi** Wats. Stems erect, caespitose, 4 to 7 inches high, arising from the branching crown of a taproot; herbage finely puberulent, glandular above; leaves linear to oblanceolate, 5 to 8 lines long, mostly 2 to 3 lines broad, somewhat fleshy, densely crowded at base, the cauline pairs few and reduced; flowers 1 to 4 or 5, in a loose terminal cluster; calyx purplish, broadly cylindrical, soon ovoid-distended, 5 lines long, the teeth rounded; corolla pink, 3 to 4 lines broad; petal blades bifid, the segments each bearing a lateral tooth; seales lanceolate; auricles narrow, truncate; capsule obovoid, 4 to 5 lines long, the stipe almost none.

High montane, above timber line, 7000 to 8000 feet: Mt. Shasta to ne. Siskiyou, west to the Klamath Range.

Locs.—Medicine Lake Mts., *M. S. Baker*; Horse Camp, Mt. Shasta, *Jepson*; Mt. Eddy, *E. B. Copeland* 3853; near Preston Peak, *Jepson* 2882.

Refs.—*SILENE GRAYI* Wats. Proc. Am. Acad. 14: 291 (1879), type loc. Mt. Shasta, *Brewer, Hooker & Gray*, *A. S. Packard, Jr.*; Rob. Bot. Gaz. 16: 44, pl. 6, figs. 7, 8 (1891).



Fig. 105. *SILENE WATSONII* Rob. a, flower; b, petal; c, another petal, typical form. $\times 2$.

6 lines long, its teeth obtusish, scarious-margined; corolla white or rose-color, 4 to 6 lines broad; petal blades 1 to 2 lines long, bifid, the lobes obtuse, laterally short-toothed or entire; crests quadrate and obtuse, or 2-cleft; styles 3 (or 4), spirally twisted and exserted in anthesis; capsule cylindric-ovoid.

Above timber line, Sierra Nevada, 6500 to 12,000 feet, to Siskiyou Co. North to Oregon.

Locs.—Long Lake, Plumas Co., *Hall* 9349; Pyramid Peak, *Hall & Chandler* 4720; Macomb Ridge, Yosemite Park, *Jepson* 4559 (lateral teeth of petal blades often nearly or quite obsolete); Mt. Dana, *Congdon*; Mt. Warren, *Congdon*; Mt. Goddard, *Hall & Chandler* 675; Denel's Peak, upper Kern, *Hall & Babcock* 5515; Mineral King, *T. Brandegee*; Hockett Mdns., *Hall* 8471.

Refs.—*SILENE WATSONII* Rob. *Proc. Am. Acad.* 28: 143 (1893). *Lychnis californica* Wats. *Proc. Am. Acad.* 12: 248 (1877), type spms. from Ebbett's Pass (*Brewer* 2081), Mt. Dana (*Bolander*), and Sierra Co. (*Lemmon*); not *Silene californica* Dur. *Silene lacustris* Eastw. *Bot. Gaz.* 41: 284 (1906), type loc. Monarch Lake near Mineral King, *Eastwood*, seems to belong here.

S. watsonii, as well as the nearly related *S. grayi*, is variable in shape and size of the petals, but there could not be specific division of either species on this basis without violence, since our material of each represents a natural unit. It may be specially observed that the lateral lobes in both these species vary in size, and are often much reduced or obsolete.

S. SUKSDORFII Rob. (*Bot. Gaz.* 16: 44, pl. 6, figs. 9-11,—1891, type loc. Cascade Mts., Wash.) is chiefly characterized by the rounded or obsolete lateral teeth of the petals and the 10 calyx nerves anastomosing above. It is said to be allied to *S. grayi* and is attributed to Mt. Stanford, Nevada Co. (*Syn. Fl.* 1⁴: 222). In view of what has been said above the points of difference between this species on the one hand and *S. grayi* and *S. watsonii* on the other seem weakened. Such material as is before us from the Nevada Co. region we have definitely referred to *S. watsonii*.

19. AGROSTEMMA L.

Tall hairy annual, with linear exstipulate leaves and few long-peduncled purplish-red flowers. Calyx-tube ovoid, with 10 strong ribs, the 5 teeth conspicuously prolonged into foliaceous lobes exceeding the 5 large entire unappendaged petals. Stamens 10. Capsule coriaceous, dehiscent by 5 teeth.—Species 2, Mediterranean region. (Latin ager, a field, and stemma, a wreath, the showy flowers in ancient times made into garlands.)

1. *A. githago* L. CORN COCKLE. Erect, rather strictly branching, 1½ to 2 feet high, hirsute with long ascending or somewhat appressed whitish hairs, especially on the peduncles and calyx; leaves 2 to 4 inches long, 1½ to 2½ lines wide, tapering to the acute apex; flowers solitary, long-peduncled; calyx-teeth ⅝ to ⅞ inch long, rather longer than the tube, or in age much longer

21. *S. watsonii* Rob. (Fig. 105.)

Flowering stems densely caespitose on the branched crown of a taproot, 3 to 5 inches high, nearly filiform; herbage glandular-puberulent; leaves mostly crowded at base, narrowly linear to narrowly oblanceolate, ¼ to 1½ inches long, rarely exceeding 1 line in breadth; flowering stems with 1 terminal flower or often with 1 to 3 lateral short-peduncled flowers racemously scattered below the terminal flower, sometimes a lateral flower replaced by a 2-flowered cluster; calyx purplish, broadly cylindric or soon becoming obovate, 5 to

and eventually deciduous from it; corolla $\frac{7}{8}$ to $1\frac{1}{2}$ inches in diameter; blade of petals obovate, black-dotted toward the claw.

Occasional grain-field waif, native of Europe, first reported from Berkeley in 1891. Since then more widely reported but not yet common.

Locs.—Live Oak, Sutter Co., *J. A. Wilkinson* in 1908; College City, Colusa Co., *Alice King* in 1906; St. Helena, *Clara Hunt* in 1908; San Bernardino (Muhl. 8: 81).

Refs.—*AGROSTEMMA GITHAGO* L. Sp. Pl. 435 (1753), type European; Jepson, Fl. W. Mid. Cal. 166 (1901).

CERATOPHYLLACEAE. HORNWORT FAMILY.

Aquatic submerged fragile herbs, with cylindric jointed stems. Leaves whorled, sessile, exstipulate, 2 to 3 times cut into linear or filiform divisions. Flowers minute, axillary, monoecious, without perianth but surrounded by an 8 to 12-eleft persistent involucre. Staminate flower consisting of numerous stamens crowded on the receptacle; anthers sessile. Pistillate flower consisting of one pistil; ovary superior, 1-celled, with a single ovule. Fruit indehiscent, beaked by the slender persistent style, spinose or tuberculate at base. Embryo with highly developed plumule. No endosperm.

Bibliog.—Schleiden, M. J., Beitr. zur Kenntniss der Ceratophylleen (Linn. 11: 513-544, t. 11,—1837). Pearl, R., Variation and Differentiation in Ceratophyllum (Carn. Publ. 58, 1-136,—1907).

1. CERATOPHYLLUM L.

The only genus, consisting of 3 polymorphous species. (Greek keras, a horn, and phyllon, a leaf, the leaves cut into slender rigid divisions.)

1. *C. demersum* L. HORNWORT. Stems slender, $\frac{1}{2}$ to 2 feet long; leaves in whorls of 6 to 8, the segments prickly-dentate, $\frac{1}{4}$ to 1 inch long; style as long as and forming a beak to the achene; achene variable, 1 to 2 lines long, with a horn or reflexed spur on each side near the base or spurless, the margin winged or wingless, and the sides sometimes tuberculate.

Ponds and lakes: widely distributed in California. All continents. Aug. Seldom collected in fruit.

Locs.—Old Mission Dam, San Diego, *Chandler*; Ramona, *K. Brandegee*; San Bernardino, *Parish*; Mohave River at Camp Cady (near Daggett), *Parish*; Santa Cruz; Gilroy, *Jepson*; Alvarado, *Jepson*; San Francisco; Clear Lake, *Jepson*; Blue Lake, Humboldt Co., *Blasdale*.

Refs.—*CERATOPHYLLUM DEMERSUM* L. Sp. Pl. 992 (1753), type European; Jepson, Fl. W. Mid. Cal. 192 (1901).

NYPHAEACEAE. WATER-LILY FAMILY.

Aquatic perennial herbs with horizontal rootstocks or with tubers. Leaves floating or erect, peltate or deeply cordate. Flowers large, solitary, complete, on long peduncles. Sepals 3 to 12. Petals 3 to many. Stamens 6 to numerous. Carpels 3 to many, superior, united into a single pistil with many cells, or distinct.—Genera 8 and species 45, widely distributed.

Bibliog.—Greene, E. L., Nymphaea and Nuphar (Bull. Torr. Club, 14: 177-179,—1887). Coville, F. V., Wokas, a primitive food of the Klamath Indians (Rep. U. S. Nat. Mus. 1902: 725-739,—1904. An interesting account of the gathering of the seeds by the Klamath Indians, accompanied by 13 plates in illustration of the plant and the harvesting process). Cook, Mel T., Development of the Embryo-sac and Embryo of *Castalia odorata* and *Nymphaea advena* (Bull. Torr. Club, 29: 211-220,—1902. As a result of his studies Cook places Nymphaeaceae in or near the order Naiadales). Miller, G. S. Jr., & Standley, P. C., The N. Am. Species of *Nymphaea* (Contrib. U. S. Nat. Herb. 16: 63-108,—1912).

Petals many; pistil 1, compound.....1. NYPHAEAE.
Petals 3 or 4; pistils several, distinct.....2. BRASENIA.

1. NYPHAEAE L. POND LILY.

Aquatic or subterrestrial plants. Scares and leaves from creeping rootstocks. Leaves cordate; petioles long. Sepals 5 to 12, conspicuous, orbicular,

concave, mostly petal-like, unless at base or on the outside. Petals 10 to 20, small and thick, bearing more or less resemblance to staminodia. Stamens numerous, densely imbricated around the ovary, at length recurving; anthers linear; filaments very short. Ovary 10 to 25-celled, the stigmas radiating upon its truncate or disk-like summit. Fruit coriaceous-baccate.—Species about 25, all continents, but chiefly in the tropics. (Latin name of the water-lily.)

1. **N. polysepala** Greene. INDIAN POND LILY. Leaves 6 to 11½ inches broad, 7 to 14½ inches long, rounded at apex, the lobes rounded and the narrow or closed sinus ⅓ to ½ the length of the blade; calyx yellow or brownish red, subglobose or somewhat cup-shaped, 3 (or when fully expanded 4 to 5) inches in diameter; sepals 9 to 12; petals 12 to 18, nearly or quite concealed beneath the many stamens; anthers dark red; stigmatic rays 15 to 24; fruit ovate or subglobose, 1 to 1½ inches in diameter, with short constricted neck and convex disk.

Ponds, central California, more especially near the coast or in the high mountains. North to Alaska and east to the Rocky Mts. The seeds are an important source of food supply to the Klamath Indians.

Locs.—Coast Ranges, near the coast: east of Santa Cruz (acc. Anderson, Nat. Hist. Santa Cruz, 35); Mountain Lake, San Francisco (Zoe, 2: 338); Olema, Brewer 1481; Santa Rosa, Chesnut; Soldiers Ridge, Yollo Bolly Mts., Jepson; Arcata, Jepson 1920; Mad River near Vances, Chandler; Log Lake, w. Siskiyou, Butler 1667; Sisson, Jepson. Sierra Nevada, 4500 to 7500 ft.: Eagle Peak Mtns., Yosemite, Hall 9192; Hetch-Hetchy to Hog Ranch, Jepson 3489; Lake Tahoe, Blasdale; Big Meadows, Plumas Co., R. M. Austin; Susan River, Honey Lake Valley, Davy 3336. Klamath Marsh, Ore., contains about 10,000 acres of solid growth (Coville).

Refs.—*NYMPHAEA POLYSEPALA* Greene, Man. Bot. Bay Reg. 8 (1894). *Nuphar polysepalum* Engelm. Trans. Acad. Sci. St. Louis, 2: 282 (1865), type loc. Osborn's Lake, Colo., Parry; Jepson, Fl. W. Mid. Cal. 193 (1901).

NYMPHAEA ADVENA Soland. in Ait. Hort. Kew, 2: 226 (1789), loc. class. Atlantic States. Leaf lobes acutish; sepals usually 6; anthers yellow.—California plants from Stockton and Clear Lake have been referred to this species by Greene (Fl. Fr. 288) and by Jepson (Fl. W. Mid. Cal. 192; Erythea, 1: 13). These are probably mere forms of *N. polysepala*. The implied opinion of Gerritt & Miller (Contrib. U. S. Nat. Herb. 16: 88) that we have only one species may well be provisionally accepted.

2. **BRASENIA** Schreb.

Leaves peltate, oval, floating, long-petioled from fleshy creeping rootstocks. Flowers small, dull purple. Sepals and petals 3 or 4. Stamens 12 to 18 with filiform filaments. Carpels 4 to 18, distinct, becoming indehiscent clavate pods.—Species 1. (Derivation unknown.)

1. **B. schreberi** Gmel. WATER SHIELD. Leaves 1½ to 4 inches long; petals linear, about 6 lines long.

Lakes and slow streams: central California and northward. North America, Asia, Africa, Australia.

Locs.—Little Kern Lake, Kern Cañon, 6200 feet, Jepson 4924; Stockton, 35 feet (Fl. Fr. 288); Lakeport, Jepson; Pit River near Ft. Crook, Brewer 2188.

Refs.—*PRASENIA SCHREBERI* Gmel. Syst. Veg. 1: 853 (1796); Jepson, Fl. W. Mid. Cal. ed. 2, 164 (1911). *B. peltata* Pursh, Fl. 389 (1814).

RANUNCULACEAE. BUTTERCUP FAMILY.

Herbs with alternate or basal leaves (excepting the opposite-leaved climber *Clematis*). Flowers with the parts all free and distinct, commonly perfect, solitary, or in terminal racemes or panicles. Sepals usually 5, always more than 2, often petal-like. Petals usually 5, often more, sometimes minute or altogether wanting. Stamens indefinite, usually numerous. Pistils several, superior, always 1-celled, bearing a single style. Fruit a follicle or achene,

rarely a berry. Seeds containing abundant endosperm and a minute embryo.—Leaves mostly palmately divided or lobed, in all cases without stipules, but the petioles often with a broad sheathing base. Flowers regular, except in *Delphinium* and *Aconitum*, and most frequently with a pronounced convex receptacle. Species of *Thalictrum* and *Clematis* are dioecious or polygamo-dioecious. Actaea has only 1 pistil. In *Paeonia*, the petals and stamens are inserted on a fleshy disk.—This is a widely diffused order, represented in all continents, consisting of 30 genera and about 1080 species. All of our genera are represented in Europe except *Trautvetteria* and *Kumlienia*, and all in the Old World except the latter. The family contains many choice garden and medicinal herbs.

Bibliog.—Hiern, W. P., *Forms and Distribution over the world of the Batrachium section of Ranunculus* (Jour. Bot. 43-49, 65-69, 97-107,—1871). Gray, A., *Notes on Myosurus* (Bull. Torr. Club, 13: 1-4,—1886); *Revision of N. Am. Ranunculi* (Proc. Am. Acad. 21: 363-378,—1886); *Delphinium*, N. Am. Sp. (Bot. Gaz. 12: 49-54,—1887). Trelease, W., *N. Am. Species of Thalictrum* (Proc. Bost. Soc. Nat. Hist. 23: 293-304, pl. 1,—1886). Prantl, K., *Morph. and Systematik der Ranunculaceen* (Engler, Bot. Jahrb. 9: 225-273,—1888). Britton, N. L., *N. Am. species of genus Anemone and the genera which have been referred to it* (Ann. N. Y. Acad. Sci. 6: 215-238,—1891); *Ranunculus repens and its eastern N. Am. allies* (Trans. N. Y. Acad. Sci. 12: 2-6,—1892). Jones, M. E., *Rev. N. Am. species Aquilegia* (Zoe, 4: 254-260,—1893). Greene, E. L., *Revision of Myosurus* (Bull. Cal. Acad. 1: 276-279,—1885); *Some Californian Ranunculi* (Bull. Torr. Club, 14: 116-119,—1887); *Remarks on the Genus Actaea* (Pitt. 2: 107-109,—1890); *On some N. Am. Ranunculi* (Pitt. 2: 58-65, 109-111,—1890); *Ranunculaceous Monotypes* (Pitt. 3: 188-195, pls. 2-4,—1897); *Segregates of Caltha leptosepala* (Pitt. 4: 73-81,—1899); *Certain Calif. Thaliactra* (Muhl. 5: 128-131,—1909). Huth, E., *Monog. Gatt. Caltha* (Helios. 9: 55-78, 99-103, t. 1,—1892); *Rev. der kleineren Ranunculaceen-Gattungen* (Engler, Bot. Jahrb. 16: 278-324,—1893); *Monog. Gatt. Delphinium* (l. c. 20: 322-499,—1895). Eastwood, A., *Notes on Cal. Species of Delphinium* (Bull. Torr. Club, 28: 667-674,—1901). Ulbrich, E., *System. Gliederung und Geog. Verbreitung Anemone* (Engler, Bot. Jahrb. 37: 172-334,—1906). Davidson, A., *The Delphinii of S. Cal.* (Muhl. 4: 33-37,—1908).

A. Ovary several to many-ovuled; fruit a follicle (a berry in Actaea).

Flowers regular, without spurs.

Petals not spurred.

Flowers solitary, rarely 2 or 3.

Petals present.

Flowers brownish red; petals roundish, inserted on a fleshy disk. . . 1. *PAEONIA*.

Flowers white; petals linear; disk none. 2. *COPTIS*.

Petals none; sepals white (rarely pinkish or bluish).

Leaves simple, round-reniform 3. *CALTHA*.

Leaves compound 4. *ISOPYRUM*.

Flowers many, in racemes, white. 5. *ACTAEA*.

Petals 5, prolonged backward into hollow spurs. 6. *AQUILEGIA*.

Flowers irregular, complete, with spurs; sepals 5.

Upper sepal spurred 7. *DELPHINIUM*.

Upper sepal helmet-like 8. *ACONITUM*.

B. Ovary usually with one ovule; fruit an achene.

Leaves alternate or basal; flowers perfect (except in most *Thaliactra*).

Petals none.

Cauline leaves in a single involueral whorl of 3; flowers mostly large. . . 9. *ANEMONE*.

Cauline leaves alternate; flowers inconspicuous.

Leaves simple; flowers perfect. 10. *TRAUTVETTERIA*.

Leaves compound; flowers commonly dioecious. 11. *THALICTRUM*.

Petals present.

Sepals spurred; achenes on a slender spike-like receptacle; diminutive herbs. 12. *MYOSURUS*.

Sepals not spurred; achenes crowded on a convex receptacle so as to appear capitate.

Petals with a nectar-pit on claw; sepals greenish or yellowish. . 13. *RANUNCULUS*.

Petals reduced to a minute stiped nectary; sepals white, corolla-like. 14. *KUMLIENIA*.

Leaves opposite; flowers polygamous; achenes with a feathery tail; woody climber. 15. *CLEMATIS*.

1. **PAEONIA** L.

Perennial herbs with ternately divided leaves. Flowers large, solitary and terminal. Calyx herbaceous, persistent. Sepals and petals 5 or 6, the latter and the numerous stamens borne on a fleshy disk adnate to the base of the calyx. Style short or none. Follicles 2 to 5, thick and leathery, several-seeded. --Species about 15, western North America, Europe, Asia. (Paion, the physician of the gods.)

1. **P. brownii** Dougl. WESTERN PEONY. Somewhat fleshy plant 8 to 14 inches high; leaves glaucous or pale, ternately or biternately divided, chiefly basal, the lobes obovate to linear-spatulate; peduncles 1 to 2 inches long; flowers $\frac{3}{4}$ to $1\frac{1}{2}$ inches broad; petals orbicular, plane, brownish red, thick and leathery, scarcely longer than the roundish concave sepals; follicles mostly 5, broadly oblong, smooth, 1 to $1\frac{1}{2}$ inches long; stems several, bending over in age and the pods resting on the ground.

Brushy hillslopes: Southern California; South Coast Ranges; Sierra Nevada from Nevada Co. north. North to Washington and east to Utah. Apr.-May.

Locs.—Palomar, *Jepson* 1561; Santa Monica Mts., *Barber*; Sisquoc River Valley, *M. S. Baker*; San Luis Mt., *Summers*; Paso Robles, *Davy*; Bell Sprs., Mendocino Co., *Davy* 5354; Greasewood Hills, w. Tehama Co., *Jepson*; Douglas City, Trinity Co., *Blasdale*; Quartz Valley, Siskiyou Co., *Butler* 1229; Ft. Bidwell, *Manning*; Hot Springs Valley, Plumas Co., *Jepson* 4102; Truckee, *Sonne*.

Refs.—**PAEONIA BROWNII** Dougl.; Hook. Fl. Bor. Am. 1: 27 (1829), type loc. Mt. Hood, Douglas; *Jepson*, Fl. W. Mid. Cal. 194 (1901).

2. **COPTIS** Salisb. GOLDTHREAD.

Low perennial herbs with slender rootstocks. Leaves basal, divided or compound. Stems scapose, bearing 1 to 3 white flowers. Sepals 5 to 7, petal-like. Petals 5 to 7, small, linear, hooded above. Stamens 10 to 25. Pistils 10 to 12, stipitate, in fruit forming an umbel of follicles.—Species 9, northern hemisphere. (Greek *koptein*, to cut, referring to the divided leaves.)

1. **C. laciniata** Gray. Scapes 2 or 3-flowered, 4 to 6 inches high; leaves trifoliate, each leaflet deeply 3 to 5-cleft or divided, or more or less completely replaced by 3 separate leaflets; leaflets ovate, serrate or incised, $\frac{3}{4}$ to 2 inches long; sepals slender, 4 to 5 lines long, the slender petals a third shorter; follicles 4 to 6 lines long, exceeding the stipes.

Woods, North Coast Ranges, near the coast, from Mendocino Co. to Del Norte Co. North to Washington.

Locs.—Prairie Camp, Comptche, upper Albion River, forming dense mats in the forest, acc. *Charlotte Hoak*; Noyo River, *Charlotte Hoak*; Van Duzen River near Buck Mt., *Tracy* 2729; South Fork Smith River, *Jepson* 2899.

Ref.—**COPTIS LACINIATA** Gray, Bot. Gaz. 12: 297 (1887), type spms. from Ore. and nw. Cal.

3. **CALTHA** L. MARSH MARIGOLD.

Perennial herbs, ours with round-cordate basal leaves and 1 to 2-flowered scapes. Rootstock short, vertical, bearing a fascicle of strong fibrous roots. Sepals 5 to 9, (in ours) white or bluish on back, showy. Petals none. Stamens numerous. Pistils 5 to 10 (or to 24), bearing ovules in 2 rows along the ventral suture, in fruit becoming follicles.—Species 16, all continents save Africa. (Ancient Latin name of the Marigold.)

1. **C. biflora** DC. Scapes 1 or 2, erect, 2 to 10 inches high, exceeding the leaves; leaves crenate or nearly entire, 1 to 3 inches broad, broader than long, the basal lobes overlapping, or their inner tips turned inward and upward; sepals 6 to 9, oblong, 5 to 7 lines long; stamens about 130; follicles stipitate.

Subalpine in marshy slopes or wet meadows: Sierra Nevada and far North Coast Ranges, 6100 to 10,500 feet. June-July.

Locs.—Hockett Mdw., Tulare Co., *Culbertson* 4379; Eagle Lake, Mineral King, *Hall & Babcock* 5360; Big Creek, Fresno Co., *Hall & Chandler* 596; Tallac, *C. J. Fox, Jr.*; Yosemite Park, *Jepson* 4337 (Peregoy Mdw.), 4526 (Piute Mt.); Hot Spring Valley, Lassen Peak, *Jepson* 4080; Marble Mt., w. Siskiyou, *Chandler* 1571; Trinity Summit, *Jepson* 2056.

Refs.—*CALTHA BIFLORA* DC. Syst. 1: 310 (1818), type from the British Columbia coast near Banks Isl., *Menzies*. *C. howellii* Greene, Pitt. 4: 79 (1899), mts. from Ore. to the Sierra Nevada. *C. rotundifolia* Greene, l. c. 80. *C. leptosepala* var. *rotundifolia* Huth. Helios. 9: 68 (1892), the entire-leaved form.

4. ISOPYRUM L.

Low glabrous slender perennials with (in ours) a cluster of fusiform tubers or thickened fibres. Leaves twice ternately compound, the leaflets 2 to 3-lobed, petiolulate. Flowers commonly white, solitary, terminal or axillary. Sepals 5, petal-like. Petals (in ours) none. Stamens 10 to 30. Follicles 5 to 10, oblong or ovate, 2 to several-seeded.—Species about 27, North America, Europe, Asia. (Isopyron, the Greek name of a species of Fumaria.)

Stamens about 23 to 27; peduncles surpassing the leaves.....1. *I. occidentale*.
Stamens about 10; peduncles not surpassing the leaves.....2. *I. stipitatum*.

1. *I. occidentale* H. & A. Plant of delicate habit; stems from a cluster of slender fusiform roots, branching above, 4 to 10 inches high; leaflets obovate or fan-shaped, 5 to 9 lines long, glaucous beneath; flowers commonly white, rarely pink, 6 to 9 lines broad; filaments slender; follicles 5 to 7, sessile, 4 to 6 lines long; seeds 8 or 9, wrinkled.

Locally rare herb of shady places in the lower mountains, 300 to 2000 feet: Coast Ranges; Sierra Nevada. Apr.

Locs.—Coast Ranges: Gabilan Peak, *Cushman* (fls. rose-red); Mt. Hamilton, *Chandler*; Weldon Cañon, Vaca Mts., *Jepson*. Sierra Nevada: Girard, Kern Co., *Heller* 7715; Kinsley, Mariposa Co., *Hoak*; Amador Co., *Hansen*.

Refs.—*ISOPYRUM OCCIDENTALE* H. & A. Bot. Beech. 316 (1840), type from California, *Douglas*; *Jepson*, Fl. W. Mid. Cal. 194 (1901). Var. *coloratum* Greene, *Erythea*, 1: 125 (1893), type loc. Gabilan (Fremont's) Peak, L. W. *Cushman*.

2. *I. stipitatum* Gray. Tufted plant 1 to 3 inches high, the stems from a cluster of numerous fusiform tubers; leaves glaucous, the leaflets or divisions oblong-oblongate or oblongish, 2 to 4 lines long; flowers whitish, 3 to 4 lines broad; filaments enlarged in the middle; follicles 6 to 11, 2½ to 3 lines long; seeds 3 or 4.

Brushy or wooded hillslopes: North Coast Ranges, from Mendocino Co. to Siskiyou, thence east to Modoc Co., 3500 to 4500 feet.

Locs.—Yreka, *Butler* 584; Hornbrook, *Howell*; Taylor Mt., Modoc Co., *M. S. Baker*.

Ref.—*ISOPYRUM STIPITATUM* Gray, Proc. Am. Acad. 12: 54 (1876), type loc. Yreka, *Greene*.

5. ACTAEA L. BANEERRY.

Perennial herbs with bi- or tri-ternately compound ample leaves. Stems tall, arising from short branching rootstocks and bearing 1 or 2 leaves. Flowers small, white, in a short terminal raceme. Sepals about 4, petal-like, roundish or obovate, concave, caducous. Petals 1 to 10, small, entire, or none. Stamens many, with small anthers and slender white filaments, longer and more showy than the petals or sepals. Pistil 1; ovules 10 in 2 rows; stigma broad, sessile, obscurely 2-lobed. Fruit a berry, somewhat poisonous.—Species 13, northern hemisphere. (Latin name of the Elder, transferred by Linnaeus to these plants.)

1. *A. spicata* L. var. *arguta* Torr. Stems one to several, 1½ to 3 feet high, arising from the scaly terminal buds of the rootstock; leaves all cauline, none basal, ½ to 2 feet long, triternately divided, then trifoliate, or the middle divisions again ternate; leaflets broadly to narrowly ovate, rather deeply incised and sharply serrate, 1 to 2½ inches long; petioles rather short; racemes terminal, 1 inch long, or with 1 or 2 small lateral racemes in the axils of the

upper leaves; tips of sepals often pinkish; petals none, or 1 to 7 (or 9) and white, oval to rhombic-spatulate, slender-clawed; stamens 11 to 35, 2 to 3 lines long; berries ellipsoid or subglobose, red or white, with polished surface, 3 to 5 lines long.

Wooded or brushy hills, mostly north slopes: Coast Ranges from Monterey Co. north to Siskiyou; Sierra Nevada; San Bernardino Mts. North to Alaska, east to the Rocky Mts.

Locs.—Coast Ranges, 100 to 7000 feet: Little Sur River, Santa Lucia Mts., *Jepson* 2582; Berkeley, *Jepson* (pistils sometimes 2 and partly united); Glenbrook, Lake Co., *Jepson*; Salmon Summit, *Jepson* 2078; Sisson, *Jepson*. Sierra Nevada, 4000 to 8200 feet: Modoc Co., *M. S. Baker*; Bear Valley, Nevada Co., *Jepson*; Mariposa Big Trees, *Jepson* 4305; Golden Trout Creek, Tulare Co., *Jepson* 4935. Southern California: Little Bear Valley, San Bernardino Mts., *Hall* 1002.

Refs.—*ACTAEA SPICATA* L. Sp. Pl. 504 (1753), type European. Var. *ARGUTA* Torr. Pac. R. Rep. 4: 63 (1857); *Jepson*, Fl. W. Mid. Cal. 203 (1901). *A. arguta* Nutt.; T. & G. Fl. 1: 35 (1838), type loc. woods of the Columbia River, *Nuttall*. *A. rubra* var. *arguta* Lawson, Rev. Canad. Ranunc. 84; *Jepson*, Fl. W. Mid. Cal. ed. 2, 167 (1911).

6. *AQUILEGIA* L. COLUMBINE.

Perennial herbs with ternately compound chiefly basal leaves, petiolulate leaflets and showy solitary flowers. Sepals 5, plane, colored like the petals. Petals 5, all alike and produced backward into large hollow spurs projecting below the calyx. Stamens numerous, some sterile inner ones with dilated filaments, appearing like scarious scales. Pistils 5, becoming several-seeded follicles.—Species about 50, northern hemisphere. (Derivation doubtful, said by some to be from the Latin aquila, an eagle, on account of the claw-like spurs.)

Flowers pendulous.

Blade of petals nearly obsolete.

Throat of petal spurs truncate, about 2 lines in diameter.....1. *A. truncata*.

Throat of petal spurs cut backward, about 4 lines in diameter.....2. *A. tracyi*.

Blade of petals 3 to 5 lines long.....3. *A. formosa*.

Flowers erect or soon becoming so.....4. *A. pubescens*.

1. *A. truncata* F. & M. Stems several, erect, branching, $1\frac{1}{2}$ to $3\frac{1}{2}$ feet high; herbage glabrous; leaves biternate, the leaflets $\frac{3}{4}$ to $1\frac{3}{4}$ inches long, broad or roundish in outline, 3-cleft or -divided, or incised, crenately toothed, mostly broadly cuneate (sometimes rounded or truncate) at base; petioles long, those of the basal leaves 1 foot long; flowers scarlet, tinged with yellow, pendulous in anthesis, the spurs, therefore, erect, 8 to 9 lines long, truncate at the orifice, the blade almost none; sepals widely spreading, 9 to 11 lines long; follicles 8 to 10 lines long, conspicuously veined, the long styles persistent.

Moist shaded places in the lower hills, or at middle altitudes in the mountains, almost throughout California. May-July.

Locs.—Southern California: Mt. San Jacinto, *Hall* 2374; Bear Valley, San Bernardino Mts., *Parish* 3692; San Antonio Mts., *Abrams* 2714. Sierra Nevada, 4500 to 10,000 feet: Rock Creek, Mt. Whitney, *Jepson* 5061; Pine Ridge, Fresno Co., *Hall & Chandler* 155; Porcupine Flat, Yosemite Park, *H. M. Evans*; Table Lake, Tuolumne Co., *Jepson* 3392; Hetch-Hetchy, *Jepson*; Bear Valley, Nevada Co., *Jepson*. Coast Ranges: San Luis Obispo, *Palmer*; Mill Creek, Santa Lucia Mts., *Jepson*; Crystal Springs Lake, San Mateo Co., *C. F. Baker* 422; Mt. Diablo, *Brewer* 1156; Green Valley Falls, Solano Co., *Platt*; Round Valley, Mendocino Co., *Westerman*; Humboldt Co., *Tracy* 2739 (Buck Mt.), 3222 (Little River); Humbug Mt., Siskiyou Co., *Butler* 1576.

Var. *pauciflora* *Jepson* n. comb. A more compact plant; leaves mostly basal, these and the nearly naked stems forming a dense heavy tuft; stems 1 to $1\frac{1}{2}$ feet high, few-flowered.—High montane in the Sierra Nevada, observed in its extreme form at Conness Creek and elsewhere in the Yosemite Park.

Refs.—*AQUILEGIA TRUNCATA* F. & M. Ind. Sem. Petrop. 9. Suppl. 8 (1844), type loc. Ft. Ross; Merritt, *Erythra*, 4: 102 (1896); *Jepson*, Fl. W. Mid. Cal. 195 (1901). Var. *PAUCIFLORA* *Jepson*. *A. pauciflora* Greene, Leaflets, 1: 76 (1904), type loc. Hockett Mtns., Tulare Co.; spms. from this station (*Hall* 8463) have glabrous and not "puberulent" filaments.

2. **A. tracyi** Jepson. Similar to the preceding; puberulent and viscid throughout, especially on the stems; upper leaves reduced to small bracts; flowers larger and stamens longer; sepals reflexed; petal spurs usually spreading more widely, the throat nearly twice the diameter of the throat in no. 1, and with its orifice cut backward obliquely and not horizontally; styles very long.

Rocky places along streams, North Coast Ranges from Marin to Napa and Mendocino cos. Also, apparently, in a glabrous form in the Santa Cruz Mts. Rare. June-Sept.

Locs.—San Anselmo Cañon, Marin Co., *Eastwood*; Howell Mt., *Tracy*; Red Mt., se. Mendocino, acc. *Purdy*.

Ref.—*AQUILEGIA TRACYI* Jepson, Fl. W. Mid. Cal. ed. 2, 165 (1911), type from Flat Creek, Howell Mt., *J. P. Tracy*.

3. **A. formosa** Fisch. Stems $1\frac{1}{2}$ to 3 feet high; flowers crimson to scarlet; sepals 8 to 10 lines long; petal blades yellow, truncate, about $\frac{1}{3}$ to $\frac{1}{2}$ the length of the crimson spurs which nearly or quite equal the spreading sepals; follicles 10 to 14 lines long.

Higher mountains, northern California from Butte Co. to Siskiyou. North to Alaska, east to Utah.

Locs.—Colby, Butte Co., *R. M. Austin*; Ross Cañon, Modoc Co., *Austin & Bruce*; Goosenest foothills, *Butler* 902; Marble Valley, *Butler* 352. Franktown, Nev., *Heller* 10,522.

Ref.—*AQUILEGIA FORMOSA* Fisch.; DC. Prod. 1: 50 (1824), type loc. Kamchatka.

4. **A. pubescens** Cov. Stems 9 to 18 inches high; leaves minutely soft-pubescent or quite glabrous; leaflets small (4 to 6 lines long), cleft and crenate at apex; flowers erect, cream yellow, varying occasionally to white or to shades of red, pink or purple; sepals oblong-ovate to ovate, 7 to 11 lines long, 4 to 5 lines broad; petal-blades obtuse, 4 to 5 lines long, their spurs 11 to 13 lines long.

Alpine, in rocky places, 9000 to 12,000 feet: Sierra Nevada from Tulare Co. to Mariposa Co. The typical pubescent form occurs south of Kings Cañon; the specimens received by us from north of Kings Cañon are glabrous or nearly so.

Locs.—Olancho Mt., *Hall & Babcock* 5230; East Fork Kern River, *Hall* 8453; Farewell Gap, *Purpus* 1420; Alta Mtns., *Hopping* 520; near Mt. Silliman, *Jepson* 757; Mt. Goddard, *Hall & Chandler* 671; Bloody Cañon, *Jepson* 4439; Mt. Dana, *Congdon*; Kuna Crest, Yosemite Park, *Jepson*.

Ref.—*AQUILEGIA PUBESCENS* Cov. Contrib. U. S. Nat. Herb. 4: 56. t. 1 (1893), type loc. White Chief Mine, Mineral King, *Coville* 1513.

7. **DELPHINIUM** L. LARKSPUR.

Herbs, ours perennial, with palmately divided leaves. Flowers in terminal racemes. Sepals 5, irregular, the upper one produced into a spur at the base. Petals 4, in unequal pairs, with small spreading usually oblique blade on a claw of about equal length, the upper developed backward into nectary-bearing spurs, which are concealed within the spur of the calyx. Pistils (in ours) 3, seldom more, becoming many-seeded follicles.—Species about 200, North America, Europe, Asia and Africa. (Greek delphinion, larkspur, derived from delphin, the flowers of some species resembling the classical figures of the dolphin.)

The upper pair of petals are smaller than the lower, usually whitish, rarely yellowish, lavender, or bluish, very obliquely 2-lobed, the longer lobe commonly notched or emarginate; lower pair commonly the same color as the sepals, limb slightly or deeply cleft (even in the same species), the upper surface with a central tuft of hairs, or ciliate, or the whole surface more or less hairy, but in this respect variable, even in one species. The species are difficult

to discriminate, and, as immaterial altho sometimes striking variations abound, there is a tendency to multiply species rather than to search rigorously for essential points of likeness. The roots are more or less differentiated and should never be neglected in making specimens. The segmentation and pubescence of the leaves, especially the lower, furnish characters useful in writing diagnoses. The seeds have distinguishing features, but may be misleading if observations are restricted to a representation of proposed species resting on single or few individuals.

All the species are probably more or less poisonous, but most occur too sparingly in California to be a menace to cattle. *D. hesperium* var. *recurvatum* is reported as poisoning cattle in the South Coast Ranges. *D. trolliifolium* has a bad reputation, whilst *D. menziesii* is the best-known of the various species oftentimes responsible for causing a heavy mortality among cattle and sheep.

Refs.—Chesnut, V. K., Principal Poisonous Plants of the U. S. (U. S. Dept. Agr. Div. Bot. Bull. 20,—1898); Preliminary Cat. of Plants Poisonous to Stock (U. S. Bur. Animal Ind. Rep.—1898). Wilcox, E. V., Larkspur Poisoning of Sheep (Mont. Agr. Exp. Bull. 15,—1897). Chesnut, V. K., and Wilcox, E. V., Stock-poisoning Plants of Montana (U. S. Dept. Agr. Div. Bot. Bull. 26,—1901). Crawford, A. C., Larkspurs as Poisonous Plants (U. S. Bur. Pl. Ind. Bull. 111, pt. 1,—1907). This last-cited paper contains many references to the literature.

A. Flowers red; foliicles glabrous; seeds sharply angled, narrowly margined.—

Section PHOENICODELPHIS.

Leaves divided into narrowly linear or lanceolate divisions; stem leafy.....1. *D. cardinale*.
Leaves parted into broad mostly obtuse divisions.

Stem few-leaved; common.....2. *D. nudicaule*.
Stem leafy; rare.....3. *D. purpusii*.

B. Flowers blue, white, pink or lavender.—Section DELPHINASTRUM.

Leaves not fan-shaped; stems freely or sparsely leafy, at least, with a few leaves towards the base; upper petals usually white, the lower simulating the color of the calyx.

Root a globose tuber or a cluster of fleshy roots.

Leaves mostly twice palmately divided or cleft and toothed.

Foliicles erect, glabrous; foothills and middle altitudes.....4. *D. decorum*.

Foliicles strongly curved-diverging, pubescent; n. Mendocino to Siskiyou and Modoc; higher altitudes.....5. *D. menziesii*.

Leaves commonly pedately divided into very narrow, mostly entire, lobes; northern Sierra Nevada at higher altitudes.....6. *D. pauciflorum*.

Root a cluster of hard woody, often fusiform, fibres.

Stems very tall; flowers numerous; pedicels spreading, the racemes loose or, at least, broad; foliicles glabrous.

Ultimate leaf-lobes little unequal, obtuse, mucronulate; raceme mostly loose; herbage glabrous; far North Coast Ranges.....7. *D. trolliifolium*.

Ultimate leaf-segments unequal, lanceolate or acute.

Flowers slightly puberulent; herbage glabrous; Sierra Nevada.....

8. *D. scopulorum*.

Flowers rather densely pubescent; herbage pubescent; coast species.....

9. *D. californicum*.

Stems tall; racemes commonly very strict or cylindric, sometimes loose; foliicles puberulent.

Petioles hirsute with spreading hairs; seeds densely covered with thin processes, as if scaly-echinate; Sierra Nevada, lower altitudes....10. *D. hansenii*.

Seeds not scaly-echinate.

Coastal or interior valley species.

Petioles hirsute with spreading hairs, mostly short; racemes of medium length and often loose; flowers commonly royal purple, rarely pinkish; mostly central Coast Ranges.....11. *D. variegatum*.

Petioles finely canescent.

Sepals densely pubescent on the back (usually blurring the color) in a median longitudinal band; pedicels mostly 2 to 6 lines long; leaf-lobes mostly short; petioles mostly short; west-central California, chiefly.....12. *D. hesperium*.

Sepals lightly pubescent on the back (not blurring the color); pedicels mostly 4 to 12 lines long; leaf-lobes usually long; petioles often long; Southern California chiefly....13. *D. parryi*.

Desert or transmontane species; leaves thickish; stems and petioles glabrous or nearly so.

Flowers a light but lively blue; leaves glabrous; Death Valley region, and Mohave and western Colorado deserts....14. *D. parishii*.

Flowers deep-blue; leaves sparingly pubescent; chiefly east side of northern Sierra Nevada.....15. *D. andersonii*.

Leaves cuneately fan-shaped; stems scape-like; inner North Coast Ranges..16. *D. uliginosus*.

1. **D. cardinale** Hook. SCARLET LARKSPUR. Stem stout, 3 to 6 feet high, leafy; leaves 3 to 9 inches broad, divided into 5 to 7 narrowly linear or lanceolate divisions, the divisions usually again lobed or parted; racemes $\frac{1}{2}$ to $1\frac{1}{2}$ feet long; pedicels of about the same length as the flowers; flowers bright scarlet; sepals 6 to 9 lines long, exceeded by the spur; petals mostly yellow, the upper unequally 2-lobed, one lobe truncate, the other very much longer, emarginate, and hairy at tip on inside; lower pair of petals with ovate blade commonly notched at apex, short-hairy on inside.

Among shrubs or bushes, mesas, foothills or washes, 500 to 1500 feet: Southern California, from the coast to the interior (cismontane) valleys, rarely extending to the borders of the Colorado Desert. Lower California. May-June.

Locs.—Little Santa Anita Cañon, San Gabriel Mts., Abrams 2647; San Bernardino, Parish; Temescal Wash, Jepson 1572 (associated with *Romneya coulteri*); Palomar, T. Brandegee; San Felipe, D. Cleveland.

Refs.—DELPHINIUM CARDINALE Hook. Bot. Mag. t. 4887 (1855), based on cult. plants, the seed sent by Wm. Lobb, who collected near Los Angeles; Torr. Bot. Mex. Bound. 30, pl. 2 (1859).

2. **D. nudicaule** T. & G. RED LARKSPUR. Stems slender, 1 to 2 feet high, few-leaved or quite naked; herbage glabrous or nearly so; leaves somewhat succulent, 3 to 5-parted into broad mostly obtuse divisions, the divisions cleft, lobed or entire; racemes 2 to 12-flowered, loose and open; pedicels 1 to $3\frac{1}{2}$ inches long, the lower often much longer than the upper; calyx red, glabrous or very sparsely puberulent; sepals 4 to 6 lines long, the spur nearly one-half longer; petals partly or mostly yellow, the upper narrowly obovate, sharply notched at summit, much larger than the small cleft lower ones; follicles glabrous, divergent-curving.

Banks of rivulets and rocky summits of the Coast Ranges from the Santa Lucia Mts. to Marin Co. and western Solano, and northward to Siskiyou Co. Also in the Sierra Nevada, but rare. North to southern Oregon.

Locs.—Coast Ranges: Santa Lucia Mts. (Zoe, 4: 148); Kings Mt., San Mateo Co., C. F. Baker 975; Mt. Day, R. J. Smith; Mt. Tamalpais, Jepson; Vaca Mts., Jepson; Kelseyville, Irwin; Ukiah, Purdy; Potter Valley, Nettie Purpus; Mt. Hull, Hall 9556; Kneeland Prairie, Tracy 2635; Humbug divide, Siskiyou Co., Butler 599. Marysville Buttes, Blankinship. Sierra Nevada: Porcupine Flat, Yosemite Park, H. M. Evans; Indian Valley, Plumas Co., R. M. Austin; Modoc Co., M. S. Baker.

Refs.—DELPHINIUM NUDICAULE T. & G. Fl. 1: 33 (1838), type from California, Douglas; Jepson, Fl. W. Mid. Cal. 197 (1901). *D. luteum* Heller, Bull. S. Cal. Acad. 2: 68 (1903), type loc. Bodega Bay, Heller 5256; leaves sparsely short-hairy; flowers pale yellow, pubescent.—Ex. char.

3. **D. purpusii** Brandegee. Stems $1\frac{1}{2}$ to 3 feet high; stems and petioles slightly pubescent, the leaves a little ciliate; leaves 2 to 3 inches broad, 3-cleft into very broad toothed or incised lobes; racemes sparsely flowered, 4 to 8 inches long; flowers purplish red or dull pink, disposed to dry lavender; sepals about 4 lines long, much shorter than the thickish spur; follicles 7 to 10 lines long.

Rocky slopes. Greenhorn Range in the extreme southern Sierra Nevada. Apr.-May. Rare.

Locs.—Chaparral, e. slope Greenhorn Range, Hall & Babcock 5073; mouth of Kern Cañon, Heller 7655.

Refs.—*DELPHINIUM PURPUSII* Brandege, Bot. Gaz. 27: 444 (1899), type loc. Erskine Creek, Kern Co., *Purpus* 5015. *D. roseum* Heller, Muhl. 2: 35 (1905), type *Heller* 7655.

4. *D. decorum* F. & M. Stem lax, 1 to $1\frac{1}{4}$ (or 2) feet high; herbage glabrous, or sometimes slightly pubescent, especially the petioles and pedicels; basal leaves thick, often somewhat succulent, roundish in outline, 1 to $2\frac{1}{2}$ inches broad, mostly shallowly 3 to 5-parted into broadly cuneate or roundish segments; segments entire, or 3-cleft or -lobed, the lobes obtuse, mucronate; upper leaves pedately 3 to 5 or rarely 7-parted into linear-oblong lobes; racemes mostly many-flowered, 2 to 4 (or 11) inches long; pedicels slender, spreading, $\frac{1}{2}$ to 1 or 2 inches long; flowers purple-violet, glabrous or nearly so; sepals oval, 5 to 8 lines long, equaled or excelled by the spur; mature foliicles thickish, oblong, glabrous, 5 to 6 lines long, erect or the tips spreading; seeds sinuous-roughened with short scales.

Open woods: Coast Ranges and Sierra Nevada foothills to Southern California. Variable in leaf outline and lobation, as, also, in branching.

Locs.—Morgan, e. Tehama Co., *Hall & Babcock* 4362; Winneshaw Creek, w. Tehama Co., *Jepson*; Calistoga, *Jepson*; Howell Mt., *Tracy* 1475; Bolinas, *Chesnut & Drew*; Mt. Diablo, *Davy* 1263; Mt. Day and Arroyo Hondo, Santa Clara Co., *R. J. Smith*; Loma Prieta, *Davy* 491; San Bernardino Mts., *Parish* 5724; Mt. San Jacinto, *Jepson* 1289; Cuyamaca Mts., *T. Brandege*.

Var. *patens* Gray. Pedicels glabrous or sparsely glandular-pubescent; deep blue, magneta, pink, or lavender-white; racemes mostly strict; flowers smaller (sepals 4 to 5 lines long); foliicles diverging from below the middle.

Open places in woods: Sierra Nevada, 3000 to 8300 feet.

Locs.—Calaveras Co., *Davy* 1507; Yosemite Park, *Jepson* 4514 (Benson Lake), 3185 (Lake Merced); Hog Ranch Road, Yosemite Park, *Hall* 8905; Hazel Green, *Jepson*; Mt. Silliman, *Jepson* 727; Limekiln Creek, Tulare Co., *Jepson* 2787; Lloyd Mdns., Kern River, *Jepson* 4898.

Refs.—*DELPHINIUM DECORUM* F. & M. Ind. Sem. Petrop. 3: 33 (1837), type loc. Bodega Port; Eastw. Bull. Torr. Club, 28: 668 (1901); *Jepson*, Fl. W. Mid. Cal. 196 (1901). *D. menziesii* of authors and collectors as to S. F. Bay region plants. Var. *racemosum* Eastw. l. c. 671 (Marin to San Mateo cos.); var. *sonomensis* Eastw. l. c., Altruria, Sonoma Co. *D. patens* Benth. Pl. Hartw. 296 (1848), type loc. plains near junction of Yuba and Feather rivers, *Hartweg* 1632.—The type of this is exactly *D. decorum* acc. Greene, Pitt. 3: 15 (1896). Var. *PATENS* Gray, Bot. Gaz. 12: 54 (1887), type, the small-flowered plant of the middle Sierras. *D. gracilentum* Greene, Pitt. 3: 15 (1896), "middle elevations of the Sierra Nevada". *D. polycladon*, Eastw. Bull. Torr. Club, 28: 669 (1901), type loc. forks of Bubbs Creek, *Eastwood*, and *D. pratense* Eastw. l. c., type loc. Horse Corral Mdns., Kings Cañon trail, *Eastwood*, apparently belong here. *D. subnudum* Eastw. l. c. 670, type loc. Squaw Valley, Fresno Co., *Eastwood*; stems pubescent with fine white spreading deflexed hairs.—Ex. char. *D. greenei* Eastw. l. c. 674, type loc. southern Sierra Nevada; Heller, Muhl. 2: 34 (1905); peduncles and pedicels glandular-hairy.—This is a merely glandular form, represented by spms. from Limekiln Creek, Tulare Co., *Jepson* 2787.

5. *D. menziesii* DC. Stem arising from a cluster of connected roundish or cylindric tubers, 6 to 11 inches high, slender, often flexuous, usually branching at the base, the branches often strongly divergent; herbage quite glabrous, or sometimes pubescent; leaves twice palmately divided and cleft into linear or oblong, mostly obtusish, lobes; racemes $2\frac{1}{2}$ to 6 inches long, mostly few (2 to several)-flowered; pedicels spreading, $\frac{1}{2}$ to 1 inch long, the lower usually elongated, 1 to $1\frac{1}{2}$ inches long; flowers blue, sparingly pubescent, with short scattered hairs; sepals 4 to 8 lines long, $\frac{3}{4}$ to as long as the slender spur; foliicles hirsutulose or nearly glabrous, 7 to 9 lines long, curving and strongly divergent from very base at maturity, rarely suberect; seeds narrowly subconic, rotately cellular-margined at the truncate end, and a little at the pointed end, rarely on the sides.

Northern Mendocino Co. to Siskiyou Co., 1000 to 6500 feet. North to British Columbia and Montana. Our Californian material represents a rather definite type which is rather too much unlike, in appearance, apparently authentic

material of this species from Vancouver Island. Our form, moreover, is insufficiently distinguished from the Californian phases of *D. pauciflorum*.

Locs.—Rowe's Sta., Mendocino Co., *Chandler* 1051; Horse Prairie, Trinity Summit, *Jepson* 2050; Dorleska, Salmon Mts., *Hall* 8596; Marble Mt., *Jepson* 2840; Yreka, *Butler* 642; Goose-nest foothills, *Butler* 901; Modoc Co., *M. S. Baker*.

Ref.—*DELPHINIUM MENZIESII* DC. Syst. 1: 355 (1818), type loc. region of Puget Sound, *Menzies*.

6. *D. pauciflorum* Nutt. Stems low (5 to 15 inches high), slender, mostly simple, few-leaved, arising from a fascicle of oblong or fusiform tubers; leaves pedately divided into nearly distinct segments; segments linear or lanceolate (sometimes oblong), entire or some of them 1 or 2-toothed, 6 to 12 lines long; racemes few, 2 to 8 (rarely more) -flowered; pedicels spreading, 4 to 12 lines long; flowers blue to pink purplish; sepals 4 to 6 lines long, much shorter than the slender spur; follicles pubescent, short-oblong (4 to 6 lines long), more or less spreading at tip in age; seeds margined on the quadrate summit but not on the angles.

Sierra Nevada, 5000 to 9100 feet, mainly from Yosemite Park northward. North to Washington and east to Colorado. May-July.

Locs.—Snow Creek, Yosemite Park, *Hall* 9185; Squaw Valley, Placer Co., *Sonne*; Mt. Tallac, *Hall & Chandler* 4636; Donner Lake, *Heller* 6940; Webber Lake, *Kennedy*; se. Siskiyou, *Hall & Babcock* 4124. Perhaps also at head of Kern River (cf. Bot. Cal. 1: 11, sub "*D. depauperatum*").

Refs.—*DELPHINIUM PAUCIFLORUM* Nutt.; T. & G. Fl. 1: 33 (1838), Rocky Mts. and Blue Mts. of Ore., *Nuttall*. Var. *nevadense* Gray, Syn. Fl. 1: 50 (1895), type spms. from Cisco, *Bolander*, and Plumas Co., *R. M. Austin*. *D. decorum* var. *nevadense* Wats. Bot. Cal. 1: 11 (1876). *D. sonnei* Greene, Pitt. 3: 246 (1897), type loc. Truekee, *Sonne*.

7. *D. trolliifolium* Gray. Cow POISON. Stems coarse, 4 to 6 feet high; herbage glabrous; leaves thinnish, $2\frac{1}{2}$ to 5 lines broad, orbicular in outline, 5 to 7-cleft into cuneate segments, the segments incised or with rounded teeth, the upper leaves with acute teeth or segments; racemes very loose below, sometimes dense above, $\frac{3}{4}$ to 1 or 2 feet long; pedicels widely spreading, 1 to $1\frac{3}{4}$ inches long, or the lowermost 3 to 5 inches long, hairy or glabrous; bractlets narrowly lanceolate, 2 to 4 lines long; flowers deep blue; sepals 4 to 5 lines long, the very slender spur nearly half again as long; follicles glabrous, 9 to 12 lines long, only slightly spreading, or sometimes strongly recurved-spreading.

Moist ground on edges of woods near the coast: Humboldt Co. North to Oregon.

Locs.—Acorn, *Jepson* 1938; Campbell's, *Chesnut & Drew*; abundant in the Mad River valley (acc. *Blasdale*, *Erythea*, 4: 187); near Buck Mt., *Tracy* 2712, 2774 (2713, flowers pink). Should be looked for in nw. Mendocino Co. also.

Ref.—*DELPHINIUM TROLLIIFOLIUM* Gray, Proc. Am. Acad. 8: 375 (1872), type from Oregon, *E. Hall*.

8. *D. scopulorum* Gray var. *glaucum* Gray. Stems tall ($2\frac{1}{2}$ to 6 feet high), very leafy; herbage glabrous, sometimes glaucous; leaves 4 to 6 inches broad, deeply 5 to 7-parted into cuneate divisions; divisions incised and cleft, the central lanceolate segments of each division prominent and salient; racemes 1 to $1\frac{1}{2}$ feet long; pedicels 5 to 7 (or 12) lines long, ascending; bractlets filiform, 4 to 6 lines long; flowers blue or purplish, puberulent, numerous in racemes 1 to $1\frac{1}{2}$ feet long; sepals 5 to 6 lines long, the spur about as long; lower petals cleft to the middle; follicles 5 to 6 lines long, glabrous.

Higher Sierra Nevada from Yosemite Park to Nevada Co., about 6000 feet. San Bernardino Mts. North to Washington and Alaska.

Locs.—Mariposa Big Trees, *Brewer* 1940; Placer Co., *Carpenter*; Truekee, *Sonne*; Lincoln Valley, *Kennedy & Doten*. San Bernardino Mts., acc. *Huth* (*Engler*, Bot. Jahrb. 20: 457) and *Parish*.

Var. **luporum** Jepson n. comb. Leaves smaller ($1\frac{1}{4}$ to $2\frac{1}{4}$ inches broad), very light green, the segments of the divisions more nearly equal; flowers comparatively few (5 to 13), in a rather loose raceme; calyx lightly villous-pubescent.—High southern Sierra Nevada (Inyo, Fresno and Tulare cos.), 10,000 feet.

Locs.—Wildflower Lake, below Kearsarge Pass, *Jepson* 889; Trail Peak, *Jepson* 933.

Refs.—*DELPHINIUM SCOPULORUM* Gray, Pl. Wright, 2: 9 (1853), type loc. Mimbres, N. Mex., *Wright* 842. Var. *GLAUCUM* Gray, Bot. Gaz. 12: 52 (1887). *D. glaucum* Wats. Bot. Cal. 2: 427 (1880), substituted for *D. scopulorum* Brew. & Wats. Bot. Cal. 1: 11 (1876), which rests on specimens from the Big Tree road, *Brewer*, and Sierra Valley, *Lemmon*. Var. *LUPORUM* Jepson. *D. luporum* Greene, Leaflets, 1: 76 (1904), type loc. Coyote Creek, Tulare Co., *Culbertson*.

9. **D. californicum** T. & G. COAST LARKSPUR. Stems stout, $2\frac{1}{2}$ to 7 feet high, sparsely pubescent, many-leaved; leaves very large, 4 to 6 inches broad, 2 to 4 inches long, deeply parted into 3 to 5 deeply incised segments; sinuses of the primary divisions mostly closed in the lower leaves, open in the upper; racemes very dense, $\frac{3}{4}$ to $1\frac{1}{2}$ feet long; pedicels 4 to 7 lines long, or the lowest somewhat more; bractlets very long and slender (4 to 8 lines long); flowers rather densely pilose-pubescent, white or whitish, or somewhat purplish inside, never fully expanded; sepals 3 to 4 lines long, commonly shorter than the spur; follicles oblong, turgid, 4 to 5 lines long, hardly, if at all, diverging; seeds black, wrinkled.

Low hills near the coast: San Luis Obispo Co. north to Pt. Reyes.

Locs.—Arroyo Grande, *Alice King*; Monterey, *F. P. McLean*, *Heller* 6822; Los Gatos, *Heller* 7457 (stems partly glabrous and glaucous); hills back of Stanford, *C. F. Baker* 842; Mission Hills, San Francisco, *Michener* & *Bioletti*; Berkeley Hills, *Greene*, Apr. 2, 1883, but probably now extinct; Albion Farm, Drake's Bay, *Jepson* 555. Also summits of the inner South Coast Range: Mt. Diablo, acc. *Greene* (*Erythea*, 1: 173); Cedar Mt., *Jepson* 6217.

Refs.—*DELPHINIUM CALIFORNICUM* T. & G. Fl. 1: 31 (1838), type from California, *Douglas*; *Jepson*, Fl. W. Mid. Cal. 195 (1901).

10. **D. hansenii** Greene. Stems slender or sometimes very coarse, commonly simple, $1\frac{1}{4}$ to 4 feet high; leaves twice or thrice palmately divided into narrow or oblong lobes; petioles hispid-hirsute; flowers pale blue to pink, lavender or white, essentially as in *D. hesperium* but usually smaller; raceme narrow, mostly dense, $1\frac{1}{2}$ to 8 inches long; pedicels 2 to 4 lines long, or the lower sometimes 1 to $1\frac{1}{2}$ inches long; seeds densely covered with minute scale-like processes.

Sierra Nevada foothills, 500 to 3500 feet. "The best type of it is Davy's 1326, Calaveras Co."—E. L. G., verbal statement, 1896. It has the aspect of *D. hesperium* and shows similar variations.

Locs.—Springville, Tulare Co., *Purpus* 5049; Milton, *Davy* 1321; Copperopolis, *Davy* 1369; Jackson, *Hansen* 104; Butte Co., *Austin* & *Bruce*. Var. *ARCUTUM* Greene; racemes more elongated ($\frac{1}{2}$ to $1\frac{1}{4}$ feet long), looser; spur strongly curved or straight.—Mountain Ranch, Calaveras Co., *Davy* 1608; Yosemite Valley, *Jepson*; Dunlap, Fresno Co., *Jepson* 2758; Greenhorn Range, *Hall* & *Babcock* 5065.

Refs.—*DELPHINIUM HANSENI* Greene, Pitt. 3: 94 (1896). *D. hesperium* var. *hansenii* Greene, Fl. Fr. 304 (1892), type loc. Amador Co., *Gco. Hansen*. Var. *ARCUTUM* Greene, Pitt. 1. c., associated with *D. hansenii*. Var. *kernense* Davidson, Muhl. 4: 37 (1908), type loc. Mt. Cummings, Tehachapi Mts., *Hasse* & *Davidson* 1703.

11. **D. variegatum** T. & G. ROYAL LARKSPUR. Stems erect, simple or branching above, $\frac{3}{4}$ to $1\frac{1}{2}$ feet high; herbage hispidulous with spreading hairs, especially at base; leaves regularly twice or thrice parted or divided, the segments oblong, mostly obtusish (or those of the upper leaves acute), mucronulate, usually diverging; raceme few (about 1 to 10)-flowered, loose, the pedicels $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, or the lower ones sometimes much elongated; flowers royal purple, rarely whitish lavender; sepals 7 to 12 lines long; spur stoutish, as long as the sepals, the tip often slightly curved; lower petals large, elliptic or roundish, commonly colored like the sepals; upper petals obliquely oblong.

whitish; follicles oblong, rather turgid, 7 to 10 lines long, hispid-pubescent; angles of the seeds narrowly winged, the wings soft-cellular, commonly sordid.

Open grassy hills, South Coast Ranges from Mendocino Co. to San Mateo Co. and San Luis Obispo Co. Commonly occurring gregariously or in small colonies.

Locs.—Potter Valley, *Nettie Purpus*; Scotts Valley, Lake Co., *Tracy*; Crystal Springs Lake, San Mateo Co., *Davy* 1067; Redwood, *Jepson* 5734; San Martin, *Chandler* 920; Paso Robles, *Barber*; Santa Margarita Valley, *Summers*. Passes into *D. parryi* var. *maritimum* Davidson, in the neighborhood of the last-named station.

It also passes into the scarcely distinguishable var. *APICULATUM* Greene; flowers usually on shorter pedicels in a cylindrical raceme.—Inner foothills from Butte, Tehama and Napa cos. southerly to Santa Clara Co.: Clear Creek, Butte Co., *Heller* 5520; Tehama Co., *Jepson*; Calistoga, *Jepson*; Oakville, *R. Kuhn*; Yountville, *Jepson*; Vacaville, *Jepson*; Montezuma Hills, *Jepson*; Antioch, *Davy* 971; near Mt. Hamilton, *Pendleton*.

Refs.—*DELPHINIUM VARIEGATUM* T. & G. Fl. 1: 32 (1838), type from California, *Douglas*; *Jepson*, Fl. W. Mid. Cal. 196 (1901). *D. emiliae* Greene, *Erythra*, 2: 120 (1894), type loc. Booth ranch, Knights Valley, *Greene*. Var. *APICULATUM* Greene, Fl. Fr. 304 (1892). *D. apiculatum* Greene, Pitt. 1: 285 (1889), type loc. plains near Byron Springs.

12. *D. hesperium* Gray. WESTERN LARKSPUR. Stem commonly simple, 1½ to 3 feet high, arising from a cluster of thick-fibrous roots or a single woody taproot; herbage shortly pubescent; leaves 2 to 3 times palmately cleft into oblong or linear spreading segments; raceme rather dense, virgate, 6 to 14 inches long; pedicels 2 to 6 lines long, or the lowest 1 inch, strictly erect; flowers commonly blue, rarely pink or white or intermediate shades; sepals 4 to 6 lines long, equaled or exceeded by the straight spur, somewhat densely puberulent on the outside or the alternate ones with a rather definite puberulent band; petals little shorter than the sepals; follicles short-oblong, 3 to 5 (or 7) lines long, pubescent; seeds with a loose cellular whitish coat, which is produced into narrow wings on the angles.

Dry open ground in the foothills: Coast Ranges (Humboldt Co. south to Contra Costa Co. and Monterey Co.). Flowering at beginning of the dry season; rather common, but occurring as scattered individuals, rarely in colonies. No one constant and definite distinction between this species and *D. parryi* has yet been advanced. The two species, in certain broad aspects, are unlike and may be retained in spite of occasional specimens (such as plants from Buck Mt., Humboldt Co.), which blur the most carefully sought differences.

Locs.—Humboldt Co., *Chandler* (Klamath River), *Tracy* 3041 (Kneeland Prairie), 2755 (Buck Mt.); Sherwood Valley, Mendocino Co., *Jepson* 1835; Vaca Mts., *Jepson*; Howell Mt., *Jepson*; South Los Guillicos, Sonoma Co., *Bioletti*; Glen Ellen, *M. S. Baker*; Mt. Tamalpais, *Bioletti*; Berkeley, *Jepson*; Mt. Diablo, *Jepson*; Pilareitos Lake, San Mateo Co., *Davy* 1152; Los Gatos, *Heller* 7440; Coyote Creek, Santa Clara Co., *Jepson*; Paso Robles, *Barber*; Thomas Valley, San Jacinto Mts., *Hall*.

Var. *recurvatum* Jepson n. comb. Habit of the species; leaves usually with narrower more acute divisions; flowers pink-lavender or lavender-white, rarely blue; sepals recurving.—Low, especially alkaline, lands, Sacramento and San Joaquin valleys, and saline valleys of the inner South Coast Ranges. This variety passes into the species and lacks distinguishing marks for specific or even good varietal status. The term linear-oblong cannot be properly applied to the sepals as exhibited in the usual collections. The sepals (2 or mostly 3 lines broad) are no narrower than often in the species, the spur is often blunt, but it is often so in the species, and as to color character both the species and this variety show a full line of the variant colors prevailing in the Californian species of the section *Delphiniastrum*.

Locs.—Willows, *Jepson*; Pit River ferry, *H. E. Brown*; Little Oak and Montezuma Hills, Solano Co., *Jepson*; Antioch, *Chesnut & Drew*; Porterville, *Donnelly*; Estrella, *Jared*; Carrizo plain, *Eastwood*; upper San Joaquin valley, Kern Co., *Davy* 1881.

Var. *cuyamaca* Jepson n. comb. Leaves thickish or subcoriaceous, the sinuses with straight rather than curving sides, the lobes broad and mainly cleft

at apex; raceme dense (like San Joaquin Co. specimens of var. *recurvatum*) or loose; flowers blue, like those of the species.—Cuyamaca Mts. Perhaps also on Mt. Pinos.

Var. *sediciosum* Jepson n. var. Leaves mostly at base, minutely pubescent or canescent, the segments filiform or narrowly linear, more or less revolute.—(Folia plerumque basalia, puberulenta vel canescentia, segmentis filiformis vel linearis angustis plus minusve revolutis.)—Monterey Co. towards the coast. This variety, with leaves simulating those in forms of *D. parryi*, may be said to represent a passing over into that species. It is inclined to lose its leaf-blades in a similar manner.

Locs.—Upper San Antonio Creek, Santa Lucia Mts., *Jepson* 1655 (type); Pacific Grove, *Tidestrom*.

Refs.—*DELPHINIUM HESPERIUM* Gray, Bot. Gaz. 12: 53 (1887), Mariposa Co. and Monterey northward to w. Ore.; *Jepson*, Fl. W. Mid. Cal. 196 (1901). *D. simplex* Brew. & Wats. Bot. Cal. 1: 10 (1876), not of Dougl. (1829). Var. *RECURVATUM* Jepson. *D. recurvatum* Greene, Pitt. 1: 285 (1889), moist subsaline grounds along the San Joaquin River from Antioch to Tulare; collection was made by Greene at Byron, Mar. 24, 1889, and may well be taken as the type; Heller, Muhl. 2: 34 (1905). Var. *CUYAMACAE* Jepson. *D. cuyamacae* Abrams, Bull. Torr. Club, 32: 538 (1905), type loc. Cuyamaca Lake, *Abrams* 3888; the leaves are similar to those of *D. andersonii*.

13. *D. parryi* Gray. Stems commonly simple, 1 to 2¾ feet high, arising from a short caudex crowning several woody-fibrous roots; herbage minutely puberulent; leaves twice divided and redivided into narrowly linear lobes, the lobes usually elongated, acute, ½ to 2½ inches long, and often arcuate-contorted; upper leaves often pedately 5-divided into filiform lobes; racemes virgate, often cylindric, sometimes loose, strict, 4 to 14 inches long; pedicels mostly 4 to 12 lines long or the lower longer; flowers blue or light purplish, rarely white-flowered; sepals 6 to 8 lines long, equaling the spur, 1½ to 2 times as long as the petals; follicles puberulent, 5 to 6 lines long; seeds with a loosely cellular whitish margin to the angles.

Sandy or loam soil, open ground, Southern California, occurring mainly from the coast to the interior (cismontane) valleys, but reaching the edge of the Colorado Desert in eastern San Diego Co.; north to the San Carlos Range and southern Sierra Nevada (Tulare Co.). May-June. With the coming on of the rainless season, the blades of the lower leaves are inclined to disjoint roughly in age, leaving the rigid petioles behind.

Locs.—San Timoteo Cañon, *Jepson*; La Presa, *Hall* 3896; Carrizo Creek, *T. Brandegee*; Coahuilla Valley, *Jepson* 1473; Menifee, *Alice King*; Winchester, *Hall* 424; Vanderventer's, *Jepson* 1429; San Jacinto River Cañon, *Hall* 2013; Riverside, *Jepson* 1221; San Bernardino, *Parish* 7091; Claremont, *Chandler*; Kaweah, *Eastwood*; Waltham Creek, near Alcalde, *Jepson* 2654; San Carlos Creek, San Carlos Range, *Jepson* 2736.

Var. *blochmanae* Jepson n. comb. Leaf-lobes narrowly linear (½ to ¾ line wide); flowers large, in a dense short raceme (2½ to 4 inches long), the light blue sepals in pleasing contrast to the white petals; sepals 8 to 11 lines long, with crisped edges; seed unknown.—Near the coast, San Luis Obispo Co. Known only at Nipoma, where first collected by W. H. Brewer, Apr. 10, 1861, and by Ida M. Blochman, thirty-two years later, the specimens of the latter exhibiting exactly the distinctive features of the earlier collection.

Var. *maritimum* Davidson. Commonly branching; leaf-lobes mostly 1 to 3 lines broad, often falcately curving; raceme loose, commonly elongated (4 to 15 inches long), the pedicels 1 to 2 inches long; flowers large, the sepals 6 to 11 lines long; angles of the seed not winged.—Coast region, San Luis Obispo south to Los Angeles Co. and San Diego. Remarkable for its wingless seeds.

Locs.—Santa Margarita Valley, *Summers*; Oso Flacco, San Luis Obispo, *Summers*; Santa Monica Cañon, *Barber* 133; San Diego, *T. Brandegee*.

Refs.—*DELPHINIUM PARRYI* Gray, Bot. Gaz. 12: 53 (1887), type loc. San Bernardino, Parry, Lemmon, Parish; Syn. Fl. 1': 48 (1895). Var. *BLOCHMANAE* Jepson. *D. blochmanae* Greene, Erythraea, 1: 247 (1893). *D. ornatum* Greene, Fl. Fr. 304 (1892), type loc. Nipoma, San Luis Obispo Co., Brewer 409. Var. *MARITIMUM* Davidson, Muhl. 4: 35 (1908), type loc. Ballona, Abrams 1186.

14. *D. parishii* Gray. Stems stout or somewhat slender, $1\frac{1}{2}$ to 2 feet high, one or several from the crown of a stout root, which forks into several deep-seated branches; herbage wholly glabrous or commonly so; leaves $\frac{3}{4}$ to $1\frac{1}{2}$ (or 2) inches broad, the basal cut into broadish segments which are again cleft or toothed, the basal similar but often more narrowly divided; raceme virgate, many-flowered, 5 to 7 inches long; pedicels 4 to 8 lines long; flowers a light but lively sky-blue; sepals 3 to 5 lines long, the petals $\frac{2}{3}$ as long; follicles obscurely puberulent, sometimes a little distended at the middle, 5 to 6 lines long; seeds as in *D. hesperium*.

Sandy washes or mesas, 500 to 7500 feet: throughout the Mohave Desert, north into Inyo Co. and south to Palm Springs in the Colorado Desert. May-June. The primary segments of the lower leaves have a disposition to be divergent, rather straight-margined and of equal breadth from base to apex, and cleft only at apex. The flowers have a characteristic and constant shade of blue, which is different from that of any other of our species. This is the only species known in the Mohave Desert.

Loes.—Red Hill, near Bishop, Heller 8247; Pleasant Cañon, Panamint Mts., Hall & Chandler 6968; Lee Well, Nelson Range, Hall & Chandler 7136; Providence Mts., T. Brandegee; Fremonts Peak, Hall & Chandler 6860; Calico Wash, Jepson 5416; Barstow, Jepson 5362; Ord Mt., Jepson 5870, 5930; Victorville, Hall 6201; Antelope Valley, Dary 2305, 2485; Palm Springs, Parish 6074.

Var. *inopinum* Jepson n. var. Stems 3 feet tall, the stems and leaves quite glabrous; sepals very narrow (suboblong), glabrous; follicles glabrous.—(Canles ped. 3 alti, canles foliaque glabra; sepala perangusta (suboblonga), glabra; folliculi glabri.)—Kern River Cañon, 7800 ft. alt., Jepson 5012. Remarkable for its high-montane habitat, its very narrow sepals and quite glabrous pale lavender calyx.

Refs.—*DELPHINIUM PARISHII* Gray, Bot. Gaz. 12: 53 (1887), type loc. West Cañon, Palm Springs, Parish. *D. coelestinum* Rydb. Bull. Torr. Club, 39: 320 (1912), type loc. s. Utah, Palmer 11; not *D. coelestinum* Franch (1894). *D. mohavense* Parish ined., as to the plant of Barstow (above cited); including also generally the plants of the Mohave Desert.

15. *D. andersonii* Gray. Stems several from the base, $1\frac{1}{2}$ to 2 feet high; herbage more or less glaucous, glabrous or nearly so, the blades lightly pilose; leaves thickish, 1 to $2\frac{1}{2}$ inches broad, deeply and incisely 2 to 3 times parted into oblong or linear segments, the teeth of the lower leaves mostly obtuse, sometimes acute; raceme rather loose, 7 to 10 inches long; pedicels $\frac{1}{2}$ to 1 (or $1\frac{1}{2}$) inches long; flowers blue; sepals 5 to 6 lines long, mostly longer than the stout spur, which is shortly curved at the blunt tip; follicles glabrous, 5 to 7 lines long.

Adobe soil: western Nevada, and in California on the desert side of the northern Sierra Nevada. It is uncertain whether this little-known species crosses the Sierra axis westward. Plants from the high Sierras could at present be referred here only with a mark of doubt and are not cited.

Loes.—(?) Shunway, Lassen Co., Bruce. Kings Cañon, Ormsby Co., Nev., C. F. Baker.

Refs.—*DELPHINIUM ANDERSONII* Gray, Bot. Gaz. 12: 53 (1887), resting on *D. menziesii* Wats. Bot. King, 11 (1871), as to plants of western Nev.

16. *D. uliginosum* Curran. Stems erect, nearly naked, 1 to 2 feet high, glabrous or sparingly hispidulose; leaves glabrous, cuneately fan-shaped, 1 to 3 inches long (on petioles as long or longer), the earliest merely cleft or toothed

at apex, the later incisely parted; racemes strict, the pedicels subequal; flowers blue or occasionally pink; sepals 3 to 6 lines long, the spur as long or longer; petals deeply notched, ciliate, and with a tuft of hairs on the upper side; follicles slender, puberulent, 4 to 6 lines long; seeds densely covered with minute blunt processes, some short, some longer and branched.

Wet places, Napa Co. north through Lake Co. to western Colusa Co.

Locs.—Howell Mt., *Tracy* 354; Butt's Cañon, Napa Co., *K. Brandegee*.

Ref.—*DELPHINIUM ULIGINOSUM* Curran, *Bull. Cal. Acad.* 1: 151 (1885), type loc. very wet swamps, Epperson's (foothills of western Colusa Co., near Lake Co. boundary), *Mary K. Curran*.

8. *ACONITUM* L. ACONITE.

Tall perennial herbs with palmately lobed leaves. Flowers showy, irregular. Sepals 5, the upper one larger and hooded or helmet-like. Upper petals 2, reduced to slender claws terminating in a nectary and covered by the helmet-like sepal, the 3 lower ones minute rudiments or wanting. Stamens numerous. Pistils 3 to 5, many-ovuled, becoming follicles in fruit.—Species about 60, northern hemisphere. (Ancient Greek name.)

1. *A. columbianum* Nutt. WESTERN MONKSHOOD. Stems $1\frac{1}{2}$ to 3 feet high, arising from thick roots; leaves roundish in outline, 2 to 3 inches broad, parted or divided into 5 cuneate toothed or incised lobes; raceme loose, sometimes paniculate, viscid-pubescent; flowers blue, rarely white; hooded sepal 6 to 7 lines long.

Wet meadows and streamlet borders, 4000 to 8000 feet: Sierra Nevada, north to Modoc Co. and west to Trinity Co. Arizona to British Columbia. July.

Locs.—Garfield Forest, Sequoia Park, *Jepson* 4663; Soda Creek, Tulare Co., *Purpus* 5275; Middle Fork Kings River, *Henrietta M. Eliot*; Pine Ridge, Fresno Co., *Hall & Chandler*; Eagle Peak, Yosemite, *Chesnut & Drew*; Donner Lake, *Heller* 6917; Plumas Co., *Platt*; Morgan, Tehama Co., *Hall & Babcock* 4413; Ft. Bidwell, *Manning*; Mt. Shasta, *Geo. B. Grant*; Shackelford Creek, w. Siskiyou, *Butler* 1774; Salmon Mts., *Hall* 8635 (flowers white).

Ref.—*ACONITUM COLUMBIANUM* Nutt.; T. & G. Fl. 1: 34 (1838), type loc. Columbia River below Walla Walla, *Nuttall*. *A. fischeri* Brew. & Wats. *Bot. Cal.* 1: 12 (1876), not Reichenb.

9. *ANEMONE* L. WIND-FLOWER.

Perennial herbs, the stems and basal leaves from a rootstock. Stem leaves none except an involueral whorl of 3 near to or distant from the solitary or umbellate flowers. Sepals 5 to 8, petal-like, imbricate. Petals none. Stamens numerous. Achenes numerous, the style short or developing into a long plumose tail. Seed suspended.—Species about 90, all continents. (Greek anemos, wind, the flowers disturbed by the wind.)

Leaves 2 to 3 times finely dissected into small segments; stems from the crown of a thick root.

Styles densely hairy, becoming plumose tails in fruit.....1. *A. occidentalis*.

Styles not hairy.

Sepals elliptic or oval, 7 to 10 lines long; stems from the crown of a taproot.....

2. *A. baldensis*.
3. *A. tuberosa*.

Sepals oblong, 4 lines long; stems from a tuber.....

Leaves 3-foliate, not dissected; stems from horizontal rootstocks.

Involueral leaves sessile; rootstocks filiform4. *A. deltoidea*.

Involueral leaves petioled; rootstocks thickened5. *A. quinquefolia*.

A. Styles densely soft-hairy; achenes with long plumose tails.—Subgenus *PULSATILLA*.

1. *A. occidentalis* Wats. Stems from the crown of a thick vertical root, 4 to 15 inches high, 1-flowered; stems, petioles and midribs woolly-pubescent, mostly glabrate, except at base of bracts and of stems; leaves divided into 5 petioled divisions, the divisions 2 or 3 times divided and cleft; involueral leaves sessile by a broad base, similar to the basal leaves; sepals 5 (or 6), white "or

purplish", oval or broadly oblong, 1 inch long; achenes pubescent, their tails $\frac{3}{4}$ to 1 inch long, at length recurved, forming a globose head $1\frac{1}{2}$ to 2 inches in diameter; receptacle minutely velvety.

Alpine, 6000 to 10,000 feet: Sierra Nevada north to Mt. Shasta, thence west to western Siskiyou. North to British Columbia. June.

Locs.—Little Kern River, *Purpus* 1813; Alta Mdws., Sequoia Park, *Hopping*; Nevada Co., *Carpenter*; Lassen Peak, *Lemmon*; Mt. Shasta, *Brewer* 1419; near Marble Mt., *Jepson* 2852.

Ref.—*ANEMONE OCCIDENTALIS* Wats. Proc. Am. Acad. 11: 121 (1876), mts. from British Columbia to Mt. Shasta and Lassen Peak.

B. Styles glabrous or nearly so; achenes with glabrous or pubescent tails.—Subgenus EUANEMONE.

2. **A. baldensis** L. Stems 1 to several, 4 to 15 inches high, arising from the branching crown of a thick taproot, 1-flowered; herbage glabrate (sometimes silky when young); leaves 3 times dissected into linear or oblong acute lobes, the lobes 2 to 6 lines long; flowers white or "bluish", 1 to $1\frac{3}{4}$ inches broad; sepals 5 or 6 to 8, elliptic or oval; ovary hairy; style almost capillary, glabrous or nearly so.

Hillslopes at 5000 to 7000 feet: northern Sierra Nevada; far North Coast Ranges. June-July.

Locs.—Castle Peak, *Heller* 7099; Plumas Co.; Marble Mt., *Chandler* 1676; Salmon Mts., *Hall* 6567.

Refs.—*ANEMONE BALDENSIS* L. Mant. Pl. 1: 78 (1767), type European; Ulbrich in Engler, Bot. Jahrb. 37: 244, fig. 4C (1906). *A. drummondii* Wats. Bot. Cal. 2: 424 (1880), based chiefly on Cal. spms. from northern Sierra Nevada and Scott Mts. *A. californica* Eastw. Proc. Cal. Acad. ser. 2, 6: 423 (1896), type loc. near Lot's Lake, w. Plumas Co., *J. R. Scupham*.

3. **A. tuberosa** Rydb. Stems 4 to 10 inches high, from a tuberous root, 1 or rarely 2-flowered; leaves 3-foliolate, glabrate, the divisions ternately cleft and toothed; flowers white or purplish, 7 to 9 lines broad; sepals 8 to 10, linear-oblong; style filiform, straight, nearly as long as the ovary; achenes densely woolly.

Panamint Mts., acc. *Coville*; Arizona to Utah.

Refs.—*ANEMONE TUBEROSA* Rydb. Bull. Torr. Club, 29: 151 (1902). *A. spheonophylla* Cov. Contrib. U. S. Nat. Herb. 4: 56 (1893), not Poepp.

4. **A. deltoidea** Hook. Stems 3 to 12 inches high; rootstock filiform or whip-like, several inches long; basal leaves and involueral leaves 3-foliolate; leaflets broadly ovate or rhombic, crenately toothed above the entire base, some sparingly incised, 1 to 3 inches long; sepals commonly 5, white, 6 to 11 lines long; achenes hirsute-pubescent, with straight style.

Woods, Humboldt Co. to Siskiyou Co., 600 to 5500 feet. Northward to Washington. May-July.

Locs.—Hydesville, *Tracy* 2444; Camp Grant, *Davy* 5499; Pepperwood, *Jepson* 1913; Trinity Summit, *Jepson* 2029 (common and forming beautiful spots on the forest carpet); Salmon Mts., *Hall* 8675; near Marble Mt., *Jepson* 2848. *Colestin*, Siskiyou Mts., Ore., *W. P. Gibbons*.

Ref.—*ANEMONE DELTOIDEA* Hook. Fl. Bor. Am. 1: 6, t. 3, f. A (1829), type loc. woods, Columbia River mouth, *Douglas*.

A. OREGANA Gray, Proc. Am. Acad. 22: 308 (1887), type loc. Hood River, Ore. Involueral leaves 3-divided; flowers blue.—Oregon (Waldo, near the California line, *Howell*) and Washington.

5. **A. quinquefolia** L. var. **grayi** Jepson. WOOD ANEMONE. Stems slender, 1-flowered, 4 to 12 in. high, from a thickish rootstock; basal leaf simple, of reniform outline, trifid; involueral leaves 3-foliolate, petioled, the leaflets obovate, entire at base, crenately toothed or incised above, the lateral usually oblique,

